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*Ventilation of Dwelling Houses and the Utilisation of Waste Heat in Fireplaces.**

IN regard to the question of ventilation, Mr. Edwards's treatise, of which a second edition here appears, does not propound anything which is not familiar to all who have studied the subject; but it has the merit of furnishing a very clear and comprehensive consideration of the principles and means of ventilation in a small compass, and in a readable form, and is very well adapted to interest general readers in the matter, and to give them at the same time sound views about it. Part of the space devoted to ventilation is taken up with an account of the progress of the science (if we may consider it has reached the point of being a "science") of ventilation, and of the principles and methods adopted by leading inventors. A good many of these are illustrated by diagrams appended at the end of the volume. In the views of the writer in regard to ventilation we quite concur in the main. There are one or two points which we should question. The idea of a balance-valve chimney ventilator opening into the chimney from the upper part of the room ought now to be regarded as obsolete. If it is worth while to utilise the chimney as an assistant in carrying off the air from the upper portion of the room it is worth while to do so in the right way, viz., by utilising the heat in the chimney to create an up-draught in an up-cast ventilating-shaft contiguous to the flue, but not having any communication with the flue itself. This method is the only really scientific way of using the smoke-flue to influence extract (in addition to the extract necessarily caused by the fire). The admission of cold air at the top of the room we are not inclined to advise, as we observed in the course of a recent article on "Sanitary Discussions," because we believe it must and does bring down with it some of the vitiated air that has risen to the top of the room, and interferes with its exit at that point, which is where its exit should be. As we have often before now observed, the vitiated air naturally rises to the top of the apartment, and from thence it should be extracted, without any temptation to descend again. The proper place for the admission of fresh air is towards the lower part of the room, and where it can be warmed either by the fireplace or by heated pipes as it enters. From some of his remarks, the author appears inclined to call in question the idea that air vitiated and warmed by breathing and by contact with the body necessarily ascends. We are ready to admit that the movements of air seem often very capricious, and that we do not know all about its ways yet; but we regard the fact that vitiated air from human beings in an apartment almost invariably finds its way to the upper part of the apartment, in a very short space of time, as demonstrated too generally by experience and observation to be worth while calling in question now. No one who goes straight from the lower floor of a crowded theatre or public hall to the gallery portion will have much doubt left on that head. These questionable points, however, though we feel bound to mention them, do not invalidate the general usefulness of this part of the treatise.

The chapter on fog and smoke is rather misnamed, as the writer commences by saying that he declines to discuss the prevention of fog as out of the limits of his subject, only observing that fogs probably arise in great measure from the want of drainage of open spaces. In regard to the prevention of smoke, the author reviews several alternatives, chiefly in order to dismiss them as unsatisfactory. It is useful to have the futility of a futile plan demonstrated to the public, more especially when the plan is one which looks tempting to the ordinary mind by its theoretic completeness and comprehensive character. Thus Mr. Edwards disposes very well of the pleasing but entirely Utopian idea of making extract smoke-shafts of the sewers, and thus conveying away sewage and smoke in one conduit. This idea has seized upon the minds of some enthusiasts with irresistible attraction. It looks so neat, so complete, so satisfactory,—on paper. The author admits that if furnaces were erected for promoting the ventilation of sewers, the rarefaction of the air in the sewers would occasion air to flow into it at any openings. "If the openings belonged to the smoke-drains of houses, air and smoke would flow down those smoke-drains. It is, however, absolutely necessary that each part of the arrangement should be carefully adapted to the other. If the smoke-drains were not of sufficient size, if the sewer did not exceed in dimensions all the smoke-drains put together, and if the furnace were not of sufficient power to maintain a constant state of rarefaction throughout the sewer, there could only be a most disastrous and complete failure. If, to look at the question of dimensions, so small a computation as 3 square feet be assumed for two smoke channels from a single dwelling, and if it be assumed that a furnace and chimney-shaft be allowed for a double line of houses containing fifty on each side, the sewer for the purpose of removing smoke alone must have a sectional area of 300 square feet, or be about 17 ft. 6 in. square, and there can be no doubt that the chimney-shaft would have to be still larger; for, however powerful the furnace might be, if the whole body of air in the sewer were not perpetually maintained in a high state of rarefaction, the inevitable consequence would be that there would be a descent of air at some channels and no descent, or a variable descent, at others. Any computation with respect to the cost of maintaining such a furnace may be left to those who believe in the practicability of building a sewer as large as a good-sized room, and a chimney-shaft still larger at every 500 yards; and if they are dubious as to the size of the channels requisite for the effectual removal of smoke from every dwelling-house, and, should it be necessary, from every chamber in every dwelling-house, they have but to make a few experiments with descending flues, and they will probably find that the safest course is to profit by a little experience before propounding a startling theory." This is about the practical truth on the subject.

The author's chapter on fireplaces would be of more value in proportion to its extent if it were not so much made up of merely destructive criticism applied to show the futility of this or that scheme. The author's own conclusion is "that we must control the enormous amount of air which passes away by all chimneys with a powerful draught, unpolluted or unbreathed. Secondly, that we should and must insist on a systematic admission of fresh air in connexion with every fireplace, to replace the quantity of air which escapes from the room by the chimney, so that we may not be dependent on a mere chance-supply of doors and windows." To supply such air cold is, he considers, "a crude method," and he recommends that it should always be introduced so as to be warmed by the fire in its passage, either by Captain Galton's plan, or by such a plan as is shown in his own grate (fig. 84 of the illustrations). In the general principle advocated we entirely concur. The question of admitting the warm air at the level of the top of the fireplace, or from a flue carried (in juxtaposition with the smoke-flue) to the top of the room, is one of detail, in regard to which our present experience leaves room for some difference of opinion. We do not make out very clearly whether the author is quite decided between the merits of the two methods. Our own conviction is in favour of admitting the air at the level of the fireplace, and having only outlets at the top of the room. In regard to the first point, the regulation of the draught up the chimney, drawings are given of Dr. Arnott's smoke-consuming grate (with a lifting bottom for raising the fuel to the level of the grate as required), and of two grates of the author's; in all these there is a valve for regulating the size of the chimney outlet in proportion to the draught required, the regulator in each case being capable of being worked from the front of the fireplace. This last provision is absolutely necessary if the regulator is to be of any practical utility. No contrivance of the

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* The Ventilation of Dwelling-houses, and the Utilisation of Waste Heat from Open Fireplaces, including Chapters on London Smoke and Fog, Modern Fireplaces, &c. By Frederick Edwards, junior. Second edition, revised. London: Longmans, Green, & Co. 1881.

kind will ever really be made use of if its use involves groping up the chimney for a lever which cannot be seen, and which must always be covered with dirt and soot.

As to the question of close-bottomed grates, Mr. Edwards is in favour of a grate with a certain degree of admission of air through the bottom, though much less than is usual with the ordinary open-bar bottom. He gives a solid fire-clay basket-grate pierced with a few holes in the bottom. This we have no doubt would be a good grate, admitting a sufficiency of air to produce a cheerful fire, and retaining a continuous reservoir of heat in the material of the grate itself. Mr. Edwards, however, hardly does justice to the great economic value, in regard both to consumption of fuel and of attendance, which is ensured by a close-bottomed grate. It may be admitted that it does not produce so cheerful a fire, a point which will always have its value. But, from long experience, we can answer for the advantages of the system in regard to the economic qualities just named. In referring to this, we may mention that the author incorrectly names one scheme as "the builder's fire." It is "the *Builder* fire," getting that name throughout the country from the fact of its introduction by this journal. The arrangement is still largely used, being economical and nearly smokeless. In the remark that "in our furnaces and locomotives no one appears to dream of suggesting that coal should be burned on a solid bottom," the author seems to forget that, in such cases, in locomotives especially, a quick supply of great heat, and consequently a quick draught, is absolutely necessary. Economy of coal is studied as far as possible in firing locomotives, and the men are premiated for any saving they can effect; but this is only achieved by judgment in firing at the right moment, and in disposing the coal so as to get the greatest heating power out of a given quantity in the shortest time. But a strong draught is always essential. A locomotive sometimes runs short in steam through the mere caking of the coal on the bottom bars when the stoker is not sufficiently attentive, or does not understand his business.

Mr. Edwards complains very much of the want of fair treatment he has experienced from the press, and his preface is, in fact, an appeal to the press against their want of support of his publications, and refusal to allow him free speech on the subject. This is not a very judicious action to take. With ourselves, or with any journal competent to deal with subjects of this kind, it would, of course, make no difference one way or the other. The simple question is whether the author understands his subject. With journalists not dealing with special subjects professedly, an urgent demand for recognition is liable to be regarded as an evidence of weakness. If Mr. Edwards thinks he is a solitary victim of prejudice and want of knowledge on the part of the general press in regard to such matters, he is quite mistaken. But without committing ourselves to any opinion as to how far he is personally justified in his complaint, we nevertheless entirely endorse his opinion as to the want of knowledge, and the actual, though not probably intentional, unfairness in the manner in which speculations on practical subjects of this kind are constantly treated by the newspapers. It is perfectly true, and must be obvious to all who understand subjects of this kind and observe what is written about them in the newspapers, that the advantage of space for mention and of favourable comment in the newspapers is bestowed in the most capricious manner, and to all appearance on grounds of the social or literary position of the writer rather than on the intrinsic merits of his scheme, or his apparent knowledge of his subject. It is even whispered confidently that journalistic notice of this kind can be arranged for as a matter of business with writers who have the confidence of this or that newspaper. We do not make this remark without good ground for it; though not implying that the editors in such cases are cognisant of the misuse made of their columns in this way. Editors of general newspapers are not, of course, bound to know anything of scientific specialties. But, considering the immense power they wield, we do hold that they are bound to have some competent adviser on such subjects, who should be above trade or business influence. For want of this they often give the weight of their influence to mere pretenders, and do injustice to those who really understand their subject.

We may conclude by saying that we strongly recommend the book before us as a very able summary of the subject with which it deals, and as one of the best publications of the day for giving general information on principles and methods of heating and ventilation in a concise form.

ROYAL ACADEMY LECTURES ON ARCHITECTURE, 1881.*

BY PROFESSOR G. E. STREET, R.A.

Thirteenth Century Architecture: France.

OUR subject to-night is one of inexhaustible interest and extent. You have gathered from what I said to you about Italy, in my last lecture, how worthy the art of this age is of our deepest and most reverent study; and that there is no branch of it which is more worthy of respect than that which pursued so active and indeed extrordinary a course in France, from the middle of the twelfth down to the end of the thirteenth century. You are all aware, no doubt, that France, as we now know it, is a country gradually compacted out of a number of States or divisions, and that it was in the thirteenth century, under two distinguished sovereigns, the saintly Louis and the warlike Philip Augustus, that the greatest strides were made in welding together the kingdom of which then, as now, the Ile de France, with Paris as its capital, was both the political and the artistic centre. The various provinces preserved, however, so much of their own traditions and tastes that each presents its own local variation of style, which was rather intensified than otherwise during the thirteenth and fourteenth centuries. The buildings of Bargundy, of Anjou and Poitou, of Normandy, of Picardy, and of Champagne, are so different in their character that in the thirteenth century a man might almost have known where he was by the aspect of the architecture. The same sort of difference that existed between the North and South of Italy is visible in the North and South of France. But in the latter, the art of the North is again divided into a number of divisions answering to the provinces. To attempt in one evening to describe all these variations would be absurd, and I shall confine myself, therefore, merely to the architecture of Paris and its neighbourhood. It is necessary, before I do this, to take you back to the twelfth century, in order that you may see what the state of French art was then, and what promise it gave of the fruit which was brought to such great perfection so soon afterwards.

The great burst of enthusiasm for building which occurred in the eleventh century has left traces in all directions; and for a century before 1150 the works still remaining are conspicuous for their admirable workmanship, skilful planning, and finished detail. Without dwelling on all these points, it will be sufficient to confine ourselves to a study of their ground-plans. Here there is vast variety; but the plan which, on the whole, is evidently the most favourite, and which occurs in various stages of development in almost all parts of the country, is worth examining, because it evidently contained the germs of the great thirteenth-century cathedrals. In this the chevet, or east end, is founded on the Roman and Byzantine plans, finishing with a circle, around which are set at intervals small circular chapels,—three, four, or five in number,—which give great variety to the plan both inside and out. As an example of these, I may mention a church of the early part of the twelfth century,—Notre Dame du Port, Clermont-Ferrand,—where the covering of the aisle is a continuous barrel-vault; those of the chapels, semi-domes; whilst the central portion has a barrel-vault finished at the end in a semi-dome. The construction here is extremely ingenious. The builder had resolved that his work should last for ever; he roofed every part with stone vaults, covered outside with stone roofs, using no timber whatever in their construction. He accomplished this by giving his aisles quadrant vaults, so as to give a continuous flying buttress supporting the continuous thrust of the central vault.

What strikes one in these early churches is the resolve of their builders to make them imperishable, and the scientific disposition of their vaulted roofs, which in the chevet, owing to the combination of the aisle-chapels with the vaulted aisle, is extremely effective in perspective. The exteriors are remarkable mainly, in this case, for the use of coloured materials, and as they do not affect my argument, I omit all notice of them. One evidence of the scientific character of these buildings is that they are generally designed upon some regular system of proportion. At Notre Dame du Port, the height and width of the nave are equal, and if these are divided by four, two parts give the width of the nave, two the height of the main arcades, three that of the triforium arcade, and four the total. From first to last we cannot but be struck by the scientific and regular way in which the work is done. The same plan is seen in a number of examples, most of which,—as St. Étienne, Nevers,—have the improved arrangement of three chapels to the apse, in place of the four at Notre Dame du Port. The Church of the Holy Sepulchre is the venerable originals of such plans as these, and its example is of special interest, inasmuch as the eastern part of the church, built by the Crusaders, gives us the Auvergnat plan almost without modification, *vis-à-vis* to the apse of Constantine, which had precisely the same sort of outline at the western end of the building.

This common French plan of the apse is, we have seen, a development from a Byzantine original. The section of the vaults suggests the use of a flying buttress, and is, indeed, so nearly being one, that it was not a great step to develop a construction which should bring all the weight and thrust to one point, instead of equally along the whole length of the wall. This was done in the quadripartite aisle vaults, and it was only necessary to repeat them in the central vault to make the quadrant-vault or continuous flying buttress over the aisles quite unnecessary. And so gloomy are the interior of chambers constructed in this way, that the absence of the clearstory, so long used in earlier unvaulted buildings, must have seemed, even to the men who were building them, a most serious defect, and it is not surprising, therefore, that the combination of this with a stone vault was, above all things, what men soon strove for. At the same time, in the West of France, churches were being built on plans even more obviously derived either directly from the East or indirectly from thence through Venice. Of the latter class the most remarkable was the well-known example of St. Front, Perigueux. Here, whatever the origin of the design, we have domes carried on pointed arches springing from piers which, at their base, recal completely the planning of St. Mark's, Venice, and Sta. Fosca, Torcello, and the story of a Venetian colony settled at Perigueux is not required in order to prove that the example, if not of Venice, at any rate of countries from which the Venetians derived St. Mark's, was followed there.

At Cahors, in a church founded in 1100, we see a nave covered with domes, one to each bay, finished with an apse, and three chapels of the Auvergnat type; whilst at Angoulême, at the same date, there is a nave covered with three domes, and a choir with four chapels as at Notre Dame du Port, Clermont, save that in these two examples, there are no aisles, the chapels opening out of the central apse, after the fashion of Constantinople and Venice.

The churches in which domes, or semidomes may be found in the Centre, South, and West of France, are numberless. And it is very remarkable that, after having been so popular a feature in the eleventh and twelfth centuries, the dome should have been so entirely abandoned in all later buildings. The reasons for this are obvious. Admirable as the effect of a dome is, long experience has proved that there is no form of construction which entails so much waste of material, or such massive supports and buttresses. The French architects set themselves the task of making their buildings as light in their construction as was possible, consistently with endurance. They desired, too, to make them useful for large congregations, and they had discovered by experience how difficult it was to control the acoustic properties of a domed building. Even if they confined themselves to a central dome, the points of support were enormous masses of masonry just at the places where their inconvenience was most felt. Their common sense led them to desire the admission of light in their comparatively gloomy climate, in place of the sombre effects which are almost a necessity when the domes are solidly built of stone or brick.

As regards architectural detail in France at this early period, it is to be noticed that in a

* Fifth lecture, delivered on Monday, Feb. 28. (For previous lectures see pp. 202, 235, 265, 293, *ante*.)

great number of buildings it was of extraordinary delicacy and beauty of execution. The three western doorways of Chartres, a doorway in St. Benigne, Dijon, the south door of the nave of Le Mans, and the north and south doorways of Bourges Cathedral, all date from about 1150. They are remarkable not only for the really astounding skill of the mechanics who wrought the curious sculptures with which their columns and other members are covered, but for the remarkable fact that among the branches of foliage in which the utmost skill of Byzantine artists is rivalled, nude figures and animals are represented, with a feeling for nature which is all the more surprising when compared with the stiff and conventional representations of life-size human figures in the same work. Not long after these works, a cathedral was built, evidently by French artists, at Santiago, in Spain. It was a close copy of St. Sernin at Toulouse,—a vast church on the same plan as the Auvergnat examples,—and it had in its south transept doorways columns carved with just the same desire to represent the nude figure accurately as in the case just mentioned, and so well executed that if done before our eyes now, they would extort admiration from all. One other building must also be named as an example of delicacy in purely architectural work, the chapter-house of St. George de Boscherville, near Rouen. Here there is no sculpture of figures, and what is chiefly noticed is the beauty of execution, which is quite consummate. The century closes with an example of still greater excellence in the two earliest of the western doorways of Rouen Cathedral, in which the beauty of design and the perfection of the work leave nothing to be desired. I know no detail more worthy of study, and the wonder is that more work conceived in the same spirit was not executed. The only parallel work with which I am acquainted is that of the western doors of Genoa Cathedral, to which I have before referred, and in which the ornamentation is obtained by the use of black and white marble, while, in the Rouen examples, it is produced by deep cuttings in the stone. But this is a somewhat later work. The end of the twelfth century sees France, then, covered with buildings, mainly churches (though all others show the same art), built with great skill on well-defined plans, and adorned with details of really exquisite beauty. So far the work had been done with zeal, but under considerable hindrances. At first the grandest buildings were those of the great monasteries. Their designers were, no doubt, ecclesiastics, and the laity were comparatively unconcerned. But now there is a great change. The people take the matter out of the hands of the Church. The architects are no longer clergy, and, supported by the suddenly-awakened zeal of the people, they form themselves at once into a body of the most scientific kind conceivable, and are every day found trying some new device for the development and improvement of their work. In a few years they had changed everything; they had discovered how to utilise the pointed arch, and this discovery seems to have been like a revelation to them. The arch itself was known long before its utility was realised. It had been used constantly for some fifty years. The arches which had to carry most weight, and whose thrust it was desirable to limit, were the first to be built in this shape. The French builders had found, no doubt, how easily a round arch becomes weakened, and how serious the results are of the least giving way of the supports. But at first they saw no special beauty in the pointed arch, and adhered to the round arch for beauty and to the pointed for strength. This fact is a good illustration of the very practical character of the French architects. They loved and admired the old form, but in face of a practical advantage it was at once abandoned in favour of the new one. When once the pointed arch had been well used, and had come to be understood, their eyes were suddenly opened to perceive the powers its use conferred on them. In a few years, from being carvers they became sculptors, and at almost a single bound, from being very moderate because very conventional artists, they became the best and most skilful designers and constructors the world has ever seen. And the artist was so careless of everything but the perfection of his work, that it is rare indeed that we know his name, or anything about the way of his life or the manner in which he set to work at the development of his plans.

The French architects at this time had emancipated themselves thoroughly and once for all from old traditions. They found that the use of the pointed arch gave them a power in construction such as had never before been wielded. Before their time it was the vast mass of building or of wall, the great size of the single stones which composed it, no less than the art which decorated them, which had impressed the mind. Now it was seen that this was not the best way of securing the desired result. Every day attempts were made to improve the construction by making it more delicate and graceful. The sizes of the piers were reduced; windows were enlarged, and raised high up in the walls; the construction was of a most permanent kind, and yet it was all provided for with the least waste of material, so that the comparison between the voids and the points of support is made always largely to the credit of the Gothic architects, whenever it is made at all between their buildings and the works of the schools which preceded and succeeded them.

The names of the architects whose works are so familiar to all students are, I repeat, either unknown, or, if we know them, that is usually about all that can be said. In my last lecture we had a great deal of personal matter, for, in Italy, you are able sometimes to follow the architect about from one work to another, and you see him now architect, now sculptor, and sometimes even painter also. In France, we know much less of the life of the artist. We have the names of a good many; among them of four architects in succession at Amiens,—of Robert de Coucy, the architect of Reims, whose design was faithfully carried out by his four successors; of Eudes de Montreuil, who went to the Holy Land with St. Louis; and of many more. But were it not for the fortunate preservation of the sketch-book of one of them,—a friend, probably, of Robert de Coucy,—we should know but little of their mode of life, or thought, or work. This sketch-book or album was the property of Villard de Honecort, and it brings before us an architect in the early years of the thirteenth century wandering about on business or pleasure, visiting cathedrals, making notes and sketches of them, and evidently studying how best to improve himself. He interests himself in the best way of cutting stones, of lifting them into place, of setting-out lines for work, and so forth. He sees a lion, and forthwith sketches him, putting on his sketch (a note which may be freely translated), "Mind you, this lion was alive." He draws figures and designs for sculpture; he goes to Laon and makes a sketch of one of the western steeples, and writes below it, what most of us who have looked at and sketched it, as he did, would have agreed with, "I have been in many countries, as you may see by this book, but in no place have I seen a tower equal to that of Laon." And then, after a description of its plan, he adds, somewhat oracularly, "Meditate upon these things, for if you desire to build such great angle towers you must choose a form of sufficient projection. Proceed carefully, and you will do as a wise and careful man ought to do." Then he goes to see Reims Cathedral, which is in course of building, and sketches carefully the chapels of the apse, with notes of their details. He evidently thought very well of them, and having about this time to build the cathedral at Cambrai (now unfortunately destroyed), he gives a plan of it, in which he seems to have repeated very closely the plan and design of his favourite apse of Reims. On another page he gives a sketch of a plan of a chevet or apse which he and his friend Peter de Corbie contrived together, and, strangely enough, so new is this plan of an apse surrounded by alternately square and circular chapels, that no example of it exists in France. If he had travelled south he might have seen his suggestions anticipated in the baptistery at Albenga, on the Riviera, whilst at Toledo some Frenchman did, at about the same time, build the chevet of the largest thirteenth-century church in Europe on precisely this very plan. In another he gives a plan of a square-ended church, almost identical with our own abbeys at Beaulieu and Byland, on which he writes, "This is a square church, which was designed for the Cistercian order." Again, he gives a variety of designs for drawing the human figure enclosed within triangles. He designs foliage, animals, a lectern, a clock-case, and so on. Then he travels,—visits Hungary on business, goes to Chartres, to Lausanne, to Meaux, as well as to Laon and Reims,—everywhere, note-book in hand, and making sketches of all that strikes him most. Curiously enough he makes not a single suggestion in any of his sketches of any geometrical mode of arriving at the proportions of the buildings,—a very noteworthy fact, seeing that most of these he visited were either just built or in course of being built.

I have been thus particular in describing this book, because it gives us a glimpse behind the scenes of extraordinary interest. We see just how it was that these French buildings grew, multiplied, and developed as they did. The men who built them were as keen about their art as it was possible to be. They were disputing with each other as to possible new plans, new combinations, and repeating work the effect of which they thought perfect, and it is this sort of spirit which we see so actively at work in developing the French architecture on all hands, from the point to which it had slowly attained towards the end of the twelfth century.

I believe that in the time at my disposal this evening I cannot do better, first of all, than by showing you how this improvement and development was effected in the ground-plan of a French church. In most cases a good ground-plan involves the architectural design of a great part of the superstructure. In the best French churches it may almost be said that it involves the whole design. In those days every one gave his building a stone roof if it were possible. And nothing so certainly necessitates a scientific arrangement of the ground-plan as the provision for carrying safely a stone vault. You will observe, then, that the men who had built such a church as that of Notre Dame du Port at Clermont, or as St. Front at Perigueux, had succeeded in covering their buildings with stone, but in a way which left much to be desired. And the object of each subsequent architect was to make the construction safer, or, at least, as safe, but with much more lightness of effect, and with much less waste of material. The early churches had been derived from countries in which the climate required that windows should be neither numerous nor large; and it was not until this period that architects began to realise how unreasonable such windows were in their comparatively gloomy and cold climate. The cross-vault once introduced soon led to the discovery that the use of a pointed arch was almost essential if vaults were to be strong, and adjusted to other than regular compartments. Even in the simple vault of a building whose plan is a parallelogram, the thrust of a semicircular vault is too great, and the slightest giving way of the walls on which it rests is fatal. With a pointed vault this is not the case. The thrust outwards is comparatively small, and it was soon found that it might be counteracted not only by a buttress in the form of a pier, but by a section only of the old quadrant vault which held up the continuous vaults of Notre Dame du Port and its class. The flying-buttress adopted in this way rendered it comparatively easy to bring all the thrust to one point on the wall, because it was possible so to fortify this point as to make it certain that it would not give way. Then, when this was accomplished, it became quite unnecessary to erect thick and heavy walls between the piers and buttresses, and in course of time the construction is reduced here to a mere thin screen of tracery, throwing as little weight as need be on the piers, and only sufficient to keep the weather out of the building. In France the whole of the early buildings were, as I have told you, finished with circular east ends. And it is possible almost to count on one's fingers the examples of large churches in the thirteenth century in which a square east end is seen. The most important are the cathedrals at Laon, at Poitiers, at Dol, and the Church of St. Serge, Angers, and the churches of some religious orders, as *e.g.*, the Cistercians. Such exceptions emphatically prove the rule. Then, when it became necessary to vault these circular ends, all sorts of problems had to be met, and each man's work presents some mode of solving them different from that of his neighbour or predecessor.

The great difficulty to be overcome arose from the extremely irregular shape of every division or bay of vaulting around a circular building. In the square compartment you have an arrangement in which the arches need not be of the same height, and yet may perfectly well be vaulted with cross ribs, the ridges of the vaulting cells rising or falling to meet the arches, or being level with them. Where a succession of these vaults is required the ribs are usually semicircles, because in this way it was found that the perspective was most continuous

and effective. But this was by no means always the case. Sometimes these ribs are made of such curves as will allow of the filling-in of the cells being square with the cross arches; and sometimes, as in the Angevine and Poitevin churches, these diagonal arches are pointed arches rising high above the centre of the cross arches. In this case in the perspective half of each vault is lost behind the cross vault. It is really a most unsatisfactory sort of vaulting, and, though it was persevered in for the best part of the century in the districts named, it was rarely adopted in other parts of France, and not at all, I think, in the Ile de France. In the aisle round an apse the first solution was a continuous barrel-vault. This was very easy, but certainly not beautiful, nor was it improved when cross vaulting was introduced corresponding to the openings to the chapels or arcades on either side. But when it was attempted to divide this aisle for vaulting bays the problem was found to be very difficult. Treated like the square bays with vaulting ribs going straight from angle to angle, the effect is obviously very bad, so the diagonal ribs were usually planned so as to meet in the real centre of the compartment, though this involved a disagreeable broken line in the perspective, and was not so popular as to be accepted without protest. It was probably after seeing such vaults constructed that the chevet of Notre Dame, Paris, was planned. Here, certainly, great ingenuity is shown. The apse is divided from its aisle by five arches, and this again from the outer aisle by ten, and the vaulting compartments are all as nearly as possible equal triangles on plan. You will find this form of vault used alternately with square compartments in the aisle round the circular church at the Temple, where the same problem is solved with even greater skill. In these triangular compartments of Notre Dame there is a continuous ridge of level triangular spaces, and though a single such compartment is deficient in the light and shade of ordinary vaulting, approaching, in truth, too nearly in principle to a cradle or wagon vault, of which half of each compartment is a portion, yet in so intricate a plan as that of Notre Dame no such fault can be found, for the whole plan is full of variety and light and shade. Notre Dame was completed in 1208, but the whole exterior of the chevet was greatly modified in 1296 by the addition of a series of chapels between the buttresses. I have myself very little doubt that in Bourges Cathedral we have a chevet which illustrates the probable treatment of the original chapels of Notre Dame, all of which were destroyed in 1296. Here, as at Notre Dame, the outer wall of the second aisle has three compartments for every one in the central apse; and from the centre division of each of these a small circular chapel projects. This treatment is very beautiful. It retains the windows between the chapels, which was so marked and fine a feature of the early chevets, and relieves what would be the baldness of a chevet consisting, as M. V. le Duc assumes in the case of Notre Dame, Paris, of two aisles, without any excrescences all round the chevet. The architect of Bourges made another important modification. At Notre Dame the plan involved the placing of a column in the second series of columns opposite the centres of the arches of the first series. He abandoned the attempt to make all the vaulting compartments equal, accepted the irregular plan for the first aisle, making his intercolumniations wider than in the apse, and then showed that he knew and appreciated the Notre Dame arrangement by dividing the outer wall into three, and making one bay of quadripartite vaulting, which is an exact counterpart of that in the first aisle, only reversed, and two bays of triangular shape. Below, in the crypt, the similarity of the Notre Dame vaulting is even greater. At Bourges the chevet is a semicircle divided into five exactly equal portions, and these prolonged by twelve bays westward from the church. The architect, having resolved on an immense scale, confined himself to the simplest possible plan, but gave great originality to his design by raising the intermediate aisle to such a height as to admit of its having a secondary clearstory and triforium. Notre Dame was completed in its first form in 1208; of Bourges the date is uncertain, but it is probably safe to put it at about 1220. And in 1226 the plan of another cathedral, almost the vastest in Christendom, was made, and evidently by a Frenchman, for Toledo. Here, as you see, the plan of the chevet shows a double aisle, with compartments alternately square and triangular in both aisles. In this way all difficulties were overcome. The central column opposite the arches of the apse was avoided. The vaulting has no sameness, the compartments being alternately triangular and square, and the surrounding chapels are of the Bourges type, *i.e.*, very small, but alternately circular and square. The whole plan is one of the most beautiful ever devised, and it is strange, indeed, that the most magnificent development of the French plan should be in the ecclesiastical capital of Spain. Here, too, to complete the likeness to Bourges, the intermediate aisles have a triforium and clearstory, and the ungainliness which is certainly the fault of Bourges, is exchanged for a design in which the most captious critic can find little to complain of. The sketching architect, Villard de Honecort, when he devised a plan for a chevet in company with Peter de Corbie, made, you will remember, one almost identical with that of Toledo.

It is impossible to do more than just touch on this branch of my subject to-night. In some future year I may, perhaps, be able to deal with it more exhaustively. The varieties of the modifications of the plan of the chapels round the chevet are very great. But the main point to be observed is, that at the beginning of the century they were all planned on circular lines, and that by the end of it they were all but invariably polygonal. In Robert de Coucy's work at Reims, we see them begun on the first plan, and finished on the other; and after his time his example was generally followed. His work was planned in 1211, Amiens in 1220, Beauvais in 1225, Le Mans in 1230, Clermont in 1248, and then all follow on the lines which he laid down, and which, in a few words, had the effect of abolishing the wall and throwing all the weight on to the buttresses, so as the better to enable them to resist the thrust of the vaults. To know what French architecture was in the thirteenth century, it is, of course, requisite to know a good deal more than the story of the development of the ground-plan, though it is true that unless you study this part first you will never understand the rest of your subject. Now no way, I believe, is so good for to-night's purpose as to take some two or three churches for examination, and, so to speak, dissect them. Probably, of all the French churches, there are none in which such dissection is more profitable than it is in the case of Notre Dame, Paris, Reims Cathedral, Amiens, and Chartres. And if I take the last first, it is mainly because it is so perfect in all its parts, and so completely the work of one period and the effort of one man's skill and genius, that it presents an admirable subject for your study.

The original cathedral at Chartres was built in the eleventh century, and a vast crypt still remains of this period. Then, in 1115, a west front was commenced, and in 1194 the whole church was destroyed by fire. The new cathedral was at once commenced, but upon the old foundations. The contrivance of the new architect, who desired to plan a church suitable for the epoch, and therefore did not choose to follow strictly the lines of the early church, is well worth our consideration. At first sight, the church of Chartres has the look of being extremely original. It is, in fact, unlike any other that I know. The chapels round the outer aisle are alternately polygonal and segments of circles. This variation seems to me to be in itself very beautiful, as well as original; but when we descend to the crypt we find out at once how it has come to be contrived, and that it was, in fact, the happy result of a necessity made good use of. The original church was burnt, but the crypt sustained no damage. It extended the whole length of the church, and the architect was compelled, therefore, to build on the old lines. Compare the crypt as it was, and the church as it is, and you will say that the compulsion did not amount to much, so different are the two. But compare the two plans and you will see how ingenious the adaptation was. Examining the crypt, we see that the old church had an apse, a single aisle round it, and three deep chapels with spaces between them of the same general outline as those other Early French churches which I have already described. The architect of the church saw that by making a slight corbelling forward from the old base it would be possible to build a choir with two aisles instead of one, with moderate chapels over the old chapels, and shallow ones in the spaces between them. All this could be done, and was done, without any additions to the old foundations, and certainly with the happiest result, and it would be difficult to give any better evidence of the skill of the architect. The groining of the new chevet is somewhat complicated; the inner aisle is all quadripartite; the outer one has quadripartite vaults opposite the large chapels, and vaults of five divisions opposite and including the small intermediate chapels, whilst the three principal chapels are vaulted separately from the aisle. In some respects this plan is similar to many of later date, as may be seen at St. Pierre, Bourges, and St. Omer Cathedral, but I think the plan of Chartres is far finer than either of these, giving as it does a beautifully curved and varied outline to every part of the apse. I am the more particular in claiming this merit for Chartres, because no less an authority than M. Viollet le Duc speaks rather slightingly of it, evidently forgetting that the great merit of the plan is that the conditions were very difficult, and that an amazingly good result was obtained in spite of this fact. Nor am I, much as I admire the plan, able to praise everything without reserve in this great church. No doubt, there were many difficulties to be surmounted; not only the plan of the old church, but the people who had to be employed on the new one. Chartres had a great religious reputation. It had then, I believe, as it has now, a black Virgin, whose power of working miracles was supposed to be extraordinary. It was the epoch of the Crusades. Men were told that to work at Notre Dame, Chartres, was as good as to go to the Holy Land. And from distant places,—from Rouen among others,—crowds of people of all sorts went to aid the work at Chartres with their hands. Such is the story; and I am bound to say that there is much in the fabric which seems to confirm it. The whole scheme was a grand one. But the material,—a very coarse, calcareous limestone, full of holes,—did not admit of any delicate work, and nothing can well be rougher than the workmanship of all but certain delicate portions, as *e.g.* the two transept porches. The stones are put together in a clumsy and unworkmanlike manner. Things which are meant to fit do not do so. The cornices and galleries outside are so carelessly planned as to have to be fitted to their places by taking off and curving angles, or filling them up. The work all has the air of having been executed by men who were in a great hurry, who were not used to such work, and who were entirely careless as to the goodness of the execution as long as they could manage just to put it firmly together. This sort of execution happens also to tally with the architectural details of the general design. These are comparatively few, and not too skilful. The main columns are needlessly heavy, being about 8′6″ in diameter, though the intercolumniations are only 11′7″. The capitals are not well planned to receive the groining-piers and main arches. All the members are rude in their section, and the flying buttresses are not only very irregular in their design, but far in excess of what such a vault as they support ought to require. In the columns the very common French plan of four columns surrounding a central drum is adopted; but the columns are all alternately circular and octagonal, and agreeably varied by being made into clusters of small columns both at the crossing and at the responds. It must be noted also that the columns are alternately circular with four octagonal, and octagonal with four circular, shafts surrounding them. The mouldings are very few and very simple, and the capitals very plain and rather coarsely carved. The windows, too, are very large and very plain (the great clearstory windows are no less than 8 ft. 5 in. wide in the clear, and their only moulding is a chamfer). Finally, there is very little variety. The same design is carried on all round the church, almost without any change. But you must understand that this was all done designedly. The architect had determined to make his work depend for its effect upon a magnificent *tout ensemble*, which should be above and beyond all questions of detail. He could not but know what good work was, for the old west end and the south-west steeple had escaped the fire, and each in its way was admirable in design and detail. The three western doorways have seldom been excelled for the finished beauty of their workmanship, and the steeple is a perfect example of delicate planning and design, and he shows his own sense of what was good, for his work depended for its effect partly upon the porches of the north and south transepts, in which he has

shown such a mastery over delicate detail as has seldom been seen, and this with an originality of design and a fertility of invention which cannot be too much praised. Both porches are generally similar in outline, but extremely different in the detail of their planning, which, in the case of the northern one, is very varied and beautiful. Nowhere can be seen better than here the love of variety which so much marks Gothic work. It is as if the architect had felt himself tied and bound in his scheme for the church, and found himself breathing freely again when he had to complete the porches. There is so charming and endless a variety of canopies, of shafts, of clusters of them, of figures, of subjects, that I am at a loss to find terms warm enough for my sense of their beauty. But this will, I hope, be illustrated more fully if I am ever able, as I hope, to lecture to you on the connexion of architecture and sculpture, nowhere better seen than at Chartres. So far I have spoken of this typical cathedral of the thirteenth century without a word about its colour. This was not only internal. There is still evidence in the northern porch that, six centuries ago, the whole was covered with rich colour. No more strange departure from our present ideas of what is suitable can be conceived. Yet we must always remember that the thirteenth-century architect agreed herein intuitively with the Greek before him, and that both felt that the best architecture could not be the best until it had been beautifully coloured. But it is the profusion of colour in stained glass which is the most striking feature of the church. It is that by which almost every one must be most struck, and by which, after all, they must remember Chartres. Evidently it formed part of the original scheme. The windows are all of vast size, and, in spite of this, and of their great number, they are absolutely filled with glass of extremely rich and solid colour, all of the same age as the church, and all arranged in a generally uniform scheme, though it is varied in detail in every part. The architectural features of this portion of the work which most deserve to be noted are (1) the general arrangement in the upper windows of large figures under canopies, and in the lower windows of subjects in panels; (2) the beauty of all the drawing of foliage and ornament; and (3) the fact that all the windows, rich as they are in colour, have their leading lines marked with a white line, so that if you are in the church when light is failing, you find all the openings filled with geometrical figures or tracery. The architect of Chartres was not far from using regular tracery. In the porch he does it in a small degree, and in the great circles over the clearstory he leads the way naturally for similar figures in the glass, and finally he culminates in a magnificent rose-window of geometrical tracery in the west front. His work as it stands is perhaps the most perfect and least altered great French work of the period. It was begun, as we have seen, in 1194, and finished in 1260, and there is no evidence anywhere of a change from the first scheme during the long progress of the work. Time has dealt very tenderly with it. Few and generally unimportant alterations have been made since the dedication of the church. The whole scheme was carried out exactly on the lines dictated at the first, and nothing was left for a subsequent age to do. Compared with the puny architectural works of our own time, such an effort is simply amazing. During the same period the cathedrals of Paris, Troyes, Soissons, Reims, Amiens, Auxerre, Mantes, Beauvais, Le Mans, Bourges, Clermont, Limoges, Laon, Bayeux, Coutances, Seez, and Rouen, together with an endless array of abbeys, of castles, of churches, of hospitals, were being built. Each great cathedral must have been built by its own diocese or district, for every diocese was engaged on the same work. Yet at Chartres there is no evidence of economy or straitened means. Too great haste, indeed, is the only fault I can find evident in the execution of the work. But it was the venal fault of a city which refused to see its cathedral in ruins a day longer than was absolutely necessary.

At Notre Dame, Paris, we see the work of a very different artist, and are able to trace distinctly the great changes which have been made in the work since its first commencement. I have told you of the ground-plan already. After this, the most interesting feature is the triforium. Here, in order to resist the thrust of the main vault, the first architect constructed it with pointed barrel vaults, at right angles to the length of the church; and it is difficult to suggest a stronger form of construction. It was in this way that the twelfth-century builders of the cathedral at Tournes had vaulted their aisles, and their example was copied in one church in England, *i.e.*, by the Cistercians at Fountains. At Notre Dame it was soon destroyed in favour of flying buttresses, but at Mantes Cathedral, said to have been designed by Eudes de Montreuil, not far from Paris, much of the similar construction is still perfect. It was convenient enough, and very strong in the nave, but singularly inconvenient in its application to the irregular bays of an apse; it was probably bad for sound, and expensive and troublesome in construction. It is not to be wondered at that it was soon abandoned in favour of cross-vaults spanned by light flying buttresses. There was an immediate temptation also to reduce its strength by making openings between the vaults to a dangerous extent. At Mantes these cross-vaults are carried on slight columns, on which a flat lintel is placed, from which the cross-vaults spring. The failure of one of these columns might, therefore, involve the ruin of the clearstory which the vaults buttressed. Eudes de Montreuil, I suppose, introduced this mode of supporting the central vault, and if he was also the first architect of Notre Dame, Paris, he combined it there with a second triforium arrangement, the circular windows to light which still remain here and there. This second triforium was almost necessary when the main gallery was used by the congregation, as it still is in Notre Dame. The flying buttresses at Notre Dame are of enormous projection, sloping very slightly on the upper side, and, seen in perspective, give an extremely ungainly outline to this otherwise noble work. At St. Remi, Reims, at a slightly earlier date, the same fault is seen, but it was at once felt to be a fault, and as we see, both in Reims Cathedral and at Amiens, was immediately corrected. At Notre Dame the error committed at Chartres, of making them enormously heavy, was carefully avoided. In many respects Notre Dame affords a singularly good subject for study. It shows us as completely as any one building the vast strides made during the century. The church generally dates from quite the commencement of the century; the west front from 1214, south transept from 1257, the alteration of the choir by the addition of chapels from 1294. In this period the style had become greatly changed. In the earliest work, as in the columns of the nave, we have a stately simplicity, which imparts singular grandeur to the interior. The capitals are very large, and admirably carved with foliage arranged in architectural forms, but largely composed of natural leafage conventionalised. All the work is admirably executed. If you compare it with Chartres, you will see how admirably. The aisles are still, after the manner of Auvergne, covered with stone pavement for roofs, and the whole work has the air of being strong enough to last for ever, without being clumsy. There is nothing frittered away or small, and the western towers, each with an array of shafts in the belfry stage of unusual splendour, are, so far as complete, the finest works of the age. The change in the transepts and the chapels round the apse is great. The architect is not one jot less clever: perhaps he is even more so. His work is beautiful and beautifully executed. But the grand feeling for simplicity which had reigned supreme is no longer so evident. The mouldings have become too fine and delicate; the carving is too much a mere imitation of natural forms; and there is a sensible want of substance in the look of all the larger features, as, *e.g.*, the windows of the transepts, which look too weak to stand.

The cathedral at Reims is the next in order of date of those which I can touch upon, and is altogether, for our purpose this evening, of very singular value. Its architect was Robert de Coucy, who began it A.D. 1211, after a fire had nearly destroyed the older cathedral, leaving only portions of the two transept fronts in such a state as to allow of their being kept in the new work. The new cathedral was consecrated in 1241, but works were in progress during the whole century under a succession of architects, who must have been singularly loyal to the original design. When De Coucy began his work he had before him the great abbey church of San Remi, still standing at the other end of the town very much in the same state as it was then. It is necessary to say something about this great church; for a comparison of it with the cathedral shows extremely well the process by which developments of design are ordinarily achieved. San Remi was consecrated in 1049, and in its original state was of the severest and simplest Romanesque. In plan it had a nave about 50 ft. wide, of twelve bays in length, with a clearstory, and over the groined aisles an enormous triforium gallery for the use of worshippers. The nave, doubtless, had a wooden ceiling, and though the plan of the eastern portion had the same general arrangement as the Auvergne churches, with apsidal chapels to the transepts, the whole church seems to me to have rather more connexion with German buildings than with French. Its two western steeples illustrate this, being, in fact, lofty turrets on each side of the west front. Reims still retains a grand fragment of a Roman gateway. This has three arches, and between them three-quarter engaged columns, fluted. The San Remi builders evidently imitated this work: they regarded the columns as buttresses, and placed similar buttresses to mark the bays of their church, and at the west end they fluted them. At St. Jacques, Reims, they repeated the same feature, and it is a very interesting example of the way in which Roman buildings on the spot led to Mediæval adaptation of their features. In 1182 the east end of San Remi was taken down, rebuilt, and completed in 1198, on a plan which is nearly identical with that of a church at Chalons-sur-Marne, which was finished fifteen years earlier. An extended choir was built, with five eastern chapels, and outer aisles to the west of them as far as the transepts. The great triforium galleries of the nave were repeated, and lighted with large windows, so as to produce a very fine internal effect. Above the triforium is a simple arcade, which answers to the ordinary Gothic triforium, and above this a clearstory. There are thus four divisions in height, instead of the usual three, though this additional stage is a common feature in this part of France, as we see still at Laon and Soissons, and, as I have told you, exists at Notre Dame, Paris. By far the most beautiful feature in the building is the plan of the eastern extension, and particularly the way in which the difficulty of the aisle-groining bays in the apse has been surmounted by opening the chapels to the aisle with three arches of unequal width resting on detached shafts. This plan enabled the architect to make the vaulting of the aisle very regular in its arrangement,—a square compartment and two triangular ones to each bay, the vaulting of the chapels being octagonal, though the sides of the octagon are not all equal. The columns of the choir are all plain cylinders, with square capitals, very finely carved in a bold development from the lines of a Corinthian capital. The arches are all pointed. The choir, in spite of its vast width, is groined, as, too, are the triforium galleries. The exterior has been a good deal tampered with. But it is doubtful whether it can ever have been a really beautiful work. The proportions are low and ungainly, and the great width of the old church was a stumbling-block to the builder of the new choir. He got over the difficulties ingeniously, and in some respects, especially in the plan, certainly shows the hand of an accomplished architect.

Robert de Coucy, when he began the cathedral, had this building to study. It had been only finished thirteen years; and it is extremely interesting to see how much it affected him, and yet how immensely he improved upon it. Evidently he fully realised the beauty of the ground-plan, for his is almost an exact repetition of all its general lines. The same number of bays in the choir and apse, the same number of chapels, and the same outer aisles between the chevet and the transepts. But he dismissed at once the triforium galleries, and then gave up the fourfold division in height, and increased immensely the proportions both of the main arcade and of the clearstory; though, unfortunately as I think, he repeated the upper triforium arcade of San Remi without much alteration. The only great departure from the original ground-plan was in the arches to the chapels, in which he gave up altogether the beautiful San Remi arrangement. He could not well help himself. His dimensions in width were the same, those of height more than twice those of San Remi (124 ft. as compared with 53 ft.), and the three arches, which are well proportioned in the one case, would have looked absurdly narrow and ill-proportioned in the other. On the exterior his scheme was entirely

his own. The buttresses are admirably designed, and, in spite of the magnificent scale of the building, do not seem, as they sometimes do, to overwhelm the whole building. In short, though it is clear, if his work is attentively looked at, that he had carefully studied San Remi, it is equally clear that the alterations which he made in the proportions, in the external elevations, and in the details, were so great that few would ever be likely to discover the underlying evidence of similarity. It is this which seems to me to be so worthy of your notice. The great and accomplished architect of the cathedral had none of the conceit which prevented his seeing the good in what had been done before; but rather, with admirable skill, seized on the really fine points of the work before him, and showed how much more splendid the scheme might be made. This is the true spirit for an architect. It is the spirit in which you must work if you want to be regarded in the way in which we all think of Robert de Coucy and his work. This is the real lesson which a study of Reims Cathedral teaches. To tell you in detail anything about the cathedral would take much time. Its great virtue is its admirable simplicity throughout, save at the west end, where by the end of the century another architect showed in all its glory the latest development of the thirteenth century. Three enormous portals, covered in every portion with sculpture, above them a splendid rose-window, and on either side two steeples of rare beauty of design,—these have an interest of the same kind as the rest of the church. The neighbouring cathedral of Laon is still famous for the six steeples of its three fronts, and the exquisite treatment of their angles, which have open arrangements of arcades and shafts, square in some and circular in others. Reims was to have had six steeples also; those to the transepts were begun before De Coucy's design was made, and were evidently to be of the same type as those at Laon. But at the end of the century the architect had come to dislike the Laon system, in which the open pinnacles were built up by a succession of columns and arches, piled one on another. He thought long continuous lines of moulding more effective, and though he retained the idea of open pinnacles, he constructed their piers entirely of clusters of mouldings corresponding with those of his belfry windows. I think the architect of Laon has the best of it in the result. But it is impossible not to see the influence he exercised, any more than it is not to admire the beautiful design of the Reims steeples. As in most great French churches, the mouldings are few and simple. There are two features to which I take exception: these are the absence of a sufficient base moulding, and the overwhelming size of the great niches which crown the buttresses of the aisles, and almost conceal the clearstory from the exterior. The solidity of the whole church is much in excess of that of many later buildings; but its justification is its perfect condition structurally, and I may almost say the absence of a crack or settlement throughout its vast extent. I wish to see no finer sight than such an interior, as I saw it only yesterday hung all round with precious tapestries of the fifteenth century, which set off and adorned its superb and dignified architecture in the very best way.

Fine as are such churches as Chartres, Notre Dame, Paris, and the cathedral at Reims, I suppose that Amiens Cathedral is by common consent the greatest achievement of the century. It is difficult to say precisely why; for, not to mention others, the slightly earlier cathedral which I have just been speaking of, at Reims, is even more complete and more exactly what its first architect intended it to be. And for perfect beauty of plans and poetical inspiration of design I think Rouen goes near to excelling all. Probably the dimensions and the beautiful proportions of Amiens give it the position it has. Its columns are about 49 ft. from centre to centre across the nave, and its total height is above 140 ft., as against corresponding dimensions at Reims of 54 ft. and 124 ft. The points of support, and its glazed triforium, add to the airy lightness of effect which distinguishes it. Its proportions appear to have been regulated by the equilateral triangle. The church was for some time in progress, and the design was much modified during the erection, notably in the triforium and clearstory. What strikes one most here is the supreme constructive skill of the architect. No part of the building appears to be unduly heavy or unduly weighted. All the details are well designed and admirably fitted together. The glazed triforium, which is perhaps first seen here in a large church, is very conspicuous for its beauty and lightness, whilst the flying-buttresses and pinnacles are beautiful in their outline, and contrast admirably with the heaviness of those at Chartres, the ungainliness of those at Paris, and the apparently overwhelming size and number of those at Le Mans and Köln. The vaulting at Amiens is unlike the common French mode. In order to get as much light and shade as possible, the horizontal section is everywhere very square, and to secure this, the diagonal vaulting-ribs are not semicircles, as is commonly the case in France at this time, but compound curves generated from the transverse arches, and giving a true horizontal line for all the ridges. The lines of such vaults near the eye always, I think, look crippled; but here, at the enormous height they are above the floor, it is very difficult to follow the lines of these curves, and, therefore, there is no sense of their not being exactly true curves, whilst the best possible effect of light and shade is secured. The effect of the original scheme of the nave has been much spoilt by the addition of chapels between the buttresses of the aisles. The effect of these is to remove the windows so far back between solid walls that in the internal perspective they are not at all seen, and so the lantern-like effect which was everywhere the aim of the architect has been lost. At Amiens, as at Chartres, Paris, and Reims, sculpture has its share in the success of the work. The three great western doorways are covered with it; and many of the small subjects illustrating the labours of the Months and the signs of the Zodiac, as well as subjects from the Bible, are full of interest, though not executed by quite so good a sculptor as that of the porches at Chartres and the doorways at Paris. Here, too, let me say that the whole of the masonry of this great church is finished with a claw tool, which gave it from the first a texture far superior to the smooth surface which we all affect so much now. I mention it to you in order to direct your attention to what may seem, but is not really, a very minor point. At the time Amiens was nearing completion, the effect produced by its magnificent scale and beautiful proportions was remarkable. At Beauvais, not much more than thirty miles distant, the bishop and people were so jealous that they resolved to erect a church whose glories should completely eclipse those of their rival. Their architect lent himself to the scheme with as much zest as any of us would now. His dimensions were considerably in excess of those of Robert de Luzarches at Amiens, but his ambitious schemes were too great for safety, and had to be, to a great extent, altered after a portion had given way, so that the building, as it now stands, does not fairly represent the impossible lightness of the first scheme. In addition to an imitator at Beauvais, Amiens undoubtedly gave all his lines and plans to the German architect of Köln Cathedral, as it did to men so far off as the architects of Clermont-Ferrand and Narbonne,—perhaps, too, of Leon, in Spain. The later variations of the type are certainly no improvement on the original. We see the art gradually losing its freshness and force, and becoming, perhaps more scientific, but certainly more scholastic, and consequently far less artistic and interesting. The change can nowhere be seen better than at Köln, where, though the architect took his general scheme and his proportions from Amiens, he gave all his details so essentially hard and violent German a character as to destroy to a great extent the evidence of the parentage, without, I think, improving the effect.

I must now sum up in a few words the general characteristics of the thirteenth-century architecture of France. It was, then, a style which was always in the most rapid state of transition and development. The century begins with vast, noble, and solid erections, heavy in construction, very similar in general plan and design, and ends with works in which, though the construction was still solid, it was so scientific, so delicate in its adaptation to its requirements in every part, that it had become light and airy almost past belief. In these respects it has never been excelled before or since. In complete work of this period there is always a strict relation in every part of the plan to the work to be done. The thing to be supported dictated absolutely the shape of the support, and the nature of the material decided the character of the design. The details had all been developed and improved; the windows, from being plain and rude lancets, had become richly moulded, and splendidly designed compositions of geometrical traceries, all arranged with careful adaptation to the proper subordination of parts, the mouldings and traceries following each other in their relations to the primary, secondary, and tertiary importance of the parts. The buttresses had come to be treated as the real framework of the building. To them all weights were conveyed, and by them on to the ground. The panels enclosed between them showed no waste of wall. They were reduced to mere screens to keep out the weather, which was indeed their main if not their sole office. The proportions of height to width were much greater and much better adjusted, and the study of perspective effect, both inside and outside, was carried to the greatest perfection. The same attention to what one may fairly term a brilliant beauty of detail was exhibited in every part of the work. In sculpture, the study of nature and of life had taken the place of a steady respect for ancient and conventional representations. Foliage came to be copied directly from nature, but with an instinctive sense of the necessity of adapting it to structural purposes which is very remarkable. In a capital, for instance, though the detail was natural, the arrangement of these natural forms was strictly architectural. In a spandrel, where it was simply meant for ornament, an absolute imitation of nature is allowable, and was freely indulged in. A string-course, as we see at Amiens, was made like a garland of gay flowers carried all round a building. In the representation of the human figure a still greater progress was made. Compare the west doors of Chartres with the southern doors, and the change is made very clear. The later sculptors evidently studied from the life. They represented men in the fashion of the day, and in their faces, their attitudes, and their grouping, there is a gay and tender sentiment which seems to me to be absolutely enchanting. You are impressed, whether you will or no, with a sense of an age unlike our own, with no misery, no misfortune, nothing to mar the charm of the pleasantest and purest life; and though, of course, some men's work is infinitely in advance of others, a general high level is reached and sustained in a striking manner. Everywhere the work of the sculptor is called in to adorn the work of the architect, and so harmoniously is this done that no one can tell where the office of either began or ended. Then in all the subsidiary arts the same excellence is seen,—whether it is in the decoration of a manuscript, the painting of glass, the execution of elaborate work in all the metals, in enamelling, in embroidery,—everything was done with careful reference to the requirements of the material and the use to which the article to be manufactured had to be put. And though I am loyal to the art of my own country, I am obliged to admit that of France to be entitled to a sort of supremacy. In the previous century she had given an architect and a design to Canterbury and to Compostella; in this, she covered her own soil, stirred up the Germans to an imitation of her work at Köln, designed the great cathedrals of Toledo and Leon in Spain, and had a conspicuous influence in Italy at Genoa, Vercelli, and Assisi. In the brief space of a century the French architects had almost shown the limits of what was possible in the way of development, and left comparatively little, and that matter of detail rather than of principle, to their successors to achieve. They had a grand opportunity, and certainly availed themselves of it in the grandest way. The people seconded their efforts with a supply of means for building so large and extraordinary as to be well nigh incomprehensible. The drawbacks on their work are, generally, a want of completeness on the exterior, which has at the same time the attractiveness of the unexpected. If you build a church on the scale of Amiens it is impossible to add steeples to it which shall not either dwarf their mother church or themselves be dwarfed. A central steeple is impossible; and the examples of such a feature are very rare anywhere in France at this time, and then, generally, as at Coutances, they are an evidence of English influence. A multitude of steeples, two at each front, with a lantern occasionally in the centre, making it six or eight to one church, render it impossible to secure such effective grouping as we see in our English churches. And the enormous height certainly goes far to diminish the apparent length.

It is fortunate for you students that you are

within such easy reach of those great masterpieces of art as are the monuments of French art. The young architect may, indeed, well be advised to study first of all the art of his own country, to which that of Normandy may be considered simply as supplementary, so closely allied is it to English art. But to the sculptor students I appeal with all my strength not to neglect this vast field for study. Far be it from me ever to advise any one merely to copy what has been done before, but not to avail yourselves of it in your studies is blindly to refuse to make use of one of many of the paths which lead to real knowledge and mastery of your art. Remember what Flaxman told you about Wells, and believe me that if, as he said, you may learn much there, it is as nothing to what you may learn in France, where the examples are many-fold more numerous, of all dates, and of even greater value.

This evening I have tried to give you some faint idea of the way in which the thirteenth-century architects regarded and treated their art. This seems to me to be at least as valuable a subject for your study as are mere questions of detail; for I want to see you all working in the same spirit as those great men, and not merely trying to reproduce exactly what they have already done so well.

EXHIBITION OF THE ROYAL SCOTTISH ACADEMY.

THE exhibition for this year includes 1,047 items, but double that number have been rejected, and several of these are said to be possessed of great merit, but the artists having ignored the rule as to breadth of frame, the hanging committee felt called upon to apply the rule more stringently than heretofore, as the rage for very broad frames appears to be on the increase.

As is invariably the case, there are amongst the works exhibited several which are already familiar to a large section of the public, and to these the exhibition is greatly indebted for the attractions it possesses. Amongst them are Orchardson's "Napoleon on Board the Bellerophon," Erskine Nicol's "Storm at Sea," Sir F. Leighton's "Golden Hours," Briton Rivière's "Persepolis by Moonlight," "Stone-breakers," by G. H. Boughton, Halswelle's "Tug and Timber Barge," and portraits by Millais, Ouless, Pettie, Archer, and others.

Last year we called attention to Mr. R. Gibb's "Retreat from Moscow," as containing elements prophetic of future excellence. That work bore decided evidence of French feeling, but in the picture now before us, "The Thin Red Line," the artist has, to a certain extent, freed himself from the influence of that school, and given play to his own natural bent. The scene represents the Highland Brigade at the Battle of Balaclava withstanding the charge of the Russian cavalry. The line, which stretches diagonally in front of the spectator, is well kept, though a blank occurs here and there from casualties represented in various forms, and the effect of formality is farther obviated by the undulating nature of the ground upon which the line is formed. Only part of the Russian troops are seen, the most conspicuous figure being that of an aged officer, whose horse has been shot under him while in full career, and who clutches at his saddle-bow with one hand, and holds aloft his sword with the other. Space will not permit us to notice in detail the various incidents depicted, but it may suffice to say that the steady, unflinching, valour and diversified types of feature and expression of the heroes are rendered forcibly but without exaggeration, and that the scene as represented appears, to the ordinary spectator, more like the reality than the vast majority of battle-pieces.

That one success does not necessarily imply another appears from the principal contribution of J. L. Wyngate, whose "Quoit Players" was, last year, one of the pictures of the season. His theme, this year, is taken from the Ettrick Shepherd's song, "When the Kye come Hame," which has been a favourite with Scottish artists. The "gloaming" is a time when rustic lovers delight to meet "in a dell without a name," and here we have the happy pair; but instead of being the chief feature of the composition they somewhat lack interest, and although the cattle and accessories are artistically grouped, the scene, as a whole, is defective as regards that subdued harmony which obtains immediately before the fall of night.

W. B. Hole makes us a spectator of "Queen Mary's First Levee," when, in the early stage of infancy, the baby sovereign, in bed beside her mother, receives the homage of a mailed courtier, others looking on. The infant, in complexion and form of features, bears more resemblance to a wax-doll than a veritable baby, and yet she is endowed with an expression of premature intelligence; indeed, the whole scene has a look of artificiality about it. The artist goes to the other extreme in his representation of a group of Jacobites on the "Evening of Culloden," who, driven to the last extremity, defend themselves with desperate valour. Neither as regards composition nor execution do these works appear to us to be equal to former productions of the same hand. The peripatetic "Knife-grinder" of R. McGregor, in the pursuit of his vocation has arrived at one of those pretty villages which are happily removed from the turmoil and excitement of the centres of trade and manufacture. It is one of those spots which, when seen, as here delineated, under the influence of bright sunshine, dwells in the memory. The operations of the cutler possess sufficient attractions to bring out numbers of the villagers, who are skilfully grouped, and whose varied action and expression are truthfully rendered without the least exaggeration.

A. Melville's "Old Enemies" is admirably painted, but the story meant to be told is far from being obvious. A woman with two children are passing a market stall, but it does not appear whether she and the keepers of the stall are the parties at enmity, or the children and a turkey-cock who gobbles at their heels. Be that as it may, the work displays excellent handling and fine passages of colour.

James Hamilton essays to introduce us to a Mediæval interior, where "Strolling Dancers" are exhibiting their agility to the lady of the manor, her children and domestics, including, of course, the jester; but it plainly appears that the actors are not those of the olden time, but veritable moderns masquerading in the garb of such. The work possesses good points, and we think that Mr. Hamilton would do better were he to take his theme from every-day life. More like the reality is J. A. Houston's "Vedette," who is picturesquely placed on an expanse of open country, his figure being strongly relieved against the evening sky. Mr. Gavin continues to refer to the stock of sketches he made while at Algiers. The "Moorish Girl," lying at length on a tesselated floor, intently watching the movements of a tortoise, is very graceful in her cosy *abandon*, and the scheme of colour possesses that richness which is characteristic of the artist's work. Sir Noel Paton is only represented by a dainty pen-and-ink sketch of "Tommie Brown and the Fairy Queen." Sir Noel, like Thomas the Rhymer, must have visited fairyland, for he has the knack, as has no other painter we know, of representing the peculiarities of the wonderful little people who dwell in the regions of enchantment, and who once in a way present themselves to the gaze of favoured mortals. The veteran portrait-painter, J. M. Barclay, again makes an essay as an historical painter, but, sooth to say, with scant success. The "Incident in the Life of Bruce" is rendered in a very lifeless manner; the figures attempt to move, but they are spell-bound and without soul. The refined and attractive art of R. Herdman is displayed in the head entitled "Golden Spring," and the country lass who has "Pu'd a Rose."

Of landscape subjects we have a great variety from well-known hands, none of them very remarkable, but many exhibiting truth of expression, verisimilitude in the rendering of colour and detail, and vivid realisation of natural effects.

Of ideal sculpture we have a very graceful nude subject entitled "Echo," by D. W. Stevenson; a quaint statuette of the Laird of Dumbiedykes, by W. Brode; a telling group of "Eugene Aram" and his pupil, by T. S. Burnett; and several others, along with numerous busts of varied merit.

ROYAL INSTITUTE OF BRITISH ARCHITECTS.

ROYAL GOLD MEDAL.

AT the special general meeting, March 14th, the following resolution, moved by the President, Mr. John Whichcord, was carried by acclamation, namely,—That, subject to her Majesty's gracious sanction, the Royal Gold Medal for the year 1881 be presented to George Godwin, F.R.S., F.S.A., Past Vice-President.

PRIZE DRAWINGS AT THE INSTITUTE OF ARCHITECTS.

THE drawings submitted in competition for the various medals and other prizes at the disposal of the Institute of Architects have been arranged in the rooms during last week; they make a very good show, and are highly creditable to the industry and ability of the competitors.

For the Soane medallion, the subject of which is a County Court for a provincial town of 30,000 inhabitants, ten designs were sent in, and the medallion and reward of 50*l.*, subject to the usual conditions, have been awarded to the design by Mr. R. T. Conder, sent in under the motto "Utility." We entirely concur in the award, and observe with pleasure that the design shows evidence of some original thought, as well as of a perception of practical planning. The first point is especially to be noted, because it most frequently happens in these cases that the young designer selects a style for which he has a preference, and works it out rather with a view to correctness of detail and finish of drawing than with any attempt to originate. In the present case the design is, perhaps, a trifle too eclectic, for some of the ornamental details have hardly sufficient coherence of style or feeling to find place suitably on the same building. But the general appearance of the whole is quite sufficiently in keeping, and contrives to harmonise hints that are borrowed both from Gothic and Classic architecture. The external treatment of the staircases, in apsidal form and rising into a circular spire roof, at either end of the main block of building, is both effective and suitable. The design has also the merit of being simple and unpretending in general character, and suitable to the size of town suggested by the conditions. The design to which the certificate of honour has been awarded—"Set-square"—is in Classic style, with some originality and also some eccentricity of treatment in detail; but it is deficient in study of planning. We may observe that the raking lines of architraves to the ground-floor windows, cutting as they do through strongly-marked horizontal courses of masonry, would hardly have a good effect in execution.

The Tite prize, for the best design in the Italian style of architecture, has been gained by Mr. R. W. Collier, author of the design signed "Forum," from among five competitors; the subject being "the internal covered area of a Royal Exchange" (why "Royal"?). Speaking in the abstract, we are not in favour of offering prizes for designs in any special style; it tends to foster that merely imitative architecture which it should rather be our object to get rid of. For the present, the excuse for such a prize is that the Italian school of architecture has fallen into unmerited neglect, which was no doubt what was felt by the founder of the prize. The author of the design has shown a true feeling for the grandiose character of which this style is so capable, and he is much to be commended for his beautiful drawing and for the conscientious manner in which he has shown the details of construction of his roof, although, unfortunately, the very exigencies of the style necessitate the concealment of the construction in actual execution. The design to which the second prize of books has been awarded, by Mr. W. T. Gooch, is also creditable to its author, though with less of marked character or force of treatment.

The Grissell Gold Medal, for a tower and steeple in any style of architecture, with the details of construction clearly shown, has been awarded to Mr. F. Miller, for a design for a Gothic tower and spire, which is the best as a design, and the best drawn, though it appears to us that the second-placed competitor, Mr. J. H. Curry, has gone as fully into what was the main object of the prize, the representation of constructive detail, at least as far as the masonry is concerned, and his detail drawings are very good and clear. The author of the prize design, by the way, shows what is not often seen, a perspective of the interior of the spire looking up, and which recalls to us a curious and interesting view which we once saw of the interior of the well-known spire of Raunds, in Northamptonshire, from the same point of view, the work of a late clerical amateur long ago, before the architects had taken up Gothic as they since did.

The Institute medal for measured drawings of actual buildings (open to competitors without restriction as to age) has only evoked one set of drawings, of Kelso Abbey, by Mr. A. P. Gunston.

These, however, quite call for the award of the medal, and are admirable and careful drawings of a noble piece of Norman building. It is matter of surprise to us that this medal is not more competed for by the younger members of the profession, to whom it affords excuse for such very pleasant and instructive holiday work, and work in which those engaged upon it may also reflect that they are contributing something of permanent value to the architectural records of the country, as it is always stipulated that the building shall be one of which no adequate published illustrations are known to exist. It must be admitted, however, that the medal is hardly in itself a compensation for the time and trouble employed; and perhaps it would be better if the chief reward were the publication of the drawings at the expense of the Institute, whereby the author, who may often be a man who has time to give, but not money, may be enabled to reap the reward of his labours in a more satisfactory manner.

Five essays have been sent in for the essay medal, on the subject of "The Towers and Steeples by Wren," a remarkably interesting subject for architectural criticism and analysis. The medal has been awarded to Mr. A. T. Taylor; but concerning the merit of this and the other essays, not having had the opportunity of reading them, we cannot say anything.

THE LONDON WATER SUPPLY QUESTION AGAIN URGENT.

GRATIFYING as it is to the public writer to observe the general acceptance of some great principle of which it may be that he was, for many years, the only or almost the only advocate, it is a gratification that is pretty much of the modest nature of the answer of a good conscience. It is unattended, for the most part, by outward testimonials. Almost the only hope that a journalist can entertain in such a case is that of the tacit satisfaction of his readers. "It is just what the *Builder* has been urging for so many years," they may remark one to another. And even the echo of this remark, grateful as it would be, rarely reaches the ears to which it would give most pleasure. We ask the sympathy, or, if need be, the pardon, of our readers for these remarks, *apropos* of the tardy, but almost complete acknowledgment of the one very simple principle as to the unification of the water supply of London, which we have long and earnestly advocated. The full acceptance of that principle may now be regarded only as matter of time. The cost, delay, trouble, and vexation that would have been saved, and the magnitude of the difference that would have ensued, had our invitation to a candid consideration of the subject been accepted when made, we shall leave it to our readers to estimate.

It is now five years since the Registrar General made, as he considered, the discovery that the Metropolitan Board of Works, by borrowing 20,000,000*l.* at 4 per cent., could "buy up the capital of the gas and water companies," and "supply the ratepayers of London with gas and water at prime cost." It may now seem incredible that such a statement should have been made by any public authority so recently as June 1876. But so it was. We made it our duty at that time to point out the fallacy which underlay the calculation, which was simply the assumption that stock paying from 6 to 10 per cent. interest could be purchased at par. Somewhat later the same sum of 20,000,000*l.* was named for the purchase of the property of the water companies alone, and successive efforts, by official persons, by private persons, and by the Metropolitan Board of Works, were made to acquire the London water-works on terms that would have ensured an enormous profit to the purchaser. Had our constant warnings that this property was not obtainable, either by compulsion or otherwise, at a sum much below its true value, received attention, the Metropolitan Board of Works would have avoided the outlay and the discredit of promoting three abortive Bills.

The pendulum then swung to the other side. The late Government thought, wisely enough, that they might do good service to the inhabitants of London by purchasing the water-supply property. Unwisely enough they adopted a valuation which was as erroneous in excess, as that of the Registrar-General had been erroneous in defect. The original 10,000,000*l.* (half of the 20,000,000*l.* of the Registrar-General) now swelled to nearly 40,000,000*l.* It will be within the recollection of our readers how we combated this monstrous estimate. It will also be within their recollection that three people out of four attributed the sudden dissolution of Parliament to the discovery made as to the radical unsoundness of the Water Bill of Sir R. Cross.

Then followed the investigation of last year. The inadmissibility of the large estimate which we had condemned was proved beyond doubt. But we were unable to bring the Committee, or the Home Secretary, to look at the cardinal feature of the case. The actual *bonâ fide* rights of the companies were capable of estimate. First, they had been left out of sight; and ridiculous failure was the result. Secondly, they had been taken as unlimited, with the same consequences. The one point to which we held throughout was this. The companies have certain statutory rights. These are capable of determination, and of valuation. It is on such valuation alone that any negotiation ought to be based. The actual limit of statutory capital is one of the elements of the case. And the fact that within a determinate time every company must come to Parliament for more capital, is the key of the situation, if rightly grasped in the interest of the public,—a key equally ignored by the Registrar-General, by Mr. E. J. Smith, and by the Committee of last year.

It is thus satisfactory to find that this key, which we have for five years held out to the public, has at last been grasped, both by the Metropolitan Board of Works and by the Local Government Board. In the *Times* of the 10th current is a letter from the Chairman of the Parliamentary Committee of the Metropolitan Board of Works, Mr. G. B. Richardson, which puts this matter beyond doubt. We do not propose at the present time to offer any opinion as between the proposals of the two authorities cited, or as to the decision of the Lords Committee. Our present intention is to fix attention on the main point on which we have all along insisted,—the point, from the neglect of which so much mischief has arisen. "The tendency of things is clearly manifest," says Mr. Richardson, "that no water company will be allowed to have new borrowing powers granted to them on terms that will increase the purchase value of the undertaking, and thus there is an end to that element of value so much dwelt on by the late Mr. Smith in his evidence, the future accretions of profit." Not that even this is quite the whole truth. The writer should have said, "there will be an end to the claim for further accretions of profit beyond the earning-power of the already authorised capital."

On March 13th, 1880 (*Builder*, vol. xxxviii., p. 302), when Mr. Cross's Water Bill first made its appearance, we supplied what had not been given by, or to, that Minister, viz., a statement of the minimum of what the Bill, if passed, would cost the metropolis. Without allowing a single penny for necessary new works, this amount came to 35,787,557*l.* "Up to the time of writing," we then said, "we have nowhere seen any attempt but our own to ascertain, from the Bill itself, how large the sum to which it pledges the rates will be." The incidence of the water-rate, we then showed, would have been increased by the measure from 6·5 shillings to 8 3 shillings per soul per annum. "And more than that," we added, "it is left to us to call attention to the fact that the ratepayer, or whoever may represent him, is not quite so unarmed in the case of a conflict with the companies as has been intimated by the Home Secretary, and as must have been imagined by whoever drew up the schedule to which we have applied the simple process of addition. Three or four years hence, at the uttermost, the water companies must come to Parliament for powers, and if then it be found desirable to promote such a kind of unification as we have long ago pointed out to be possible, it can hardly be expected that Parliament would consent to the imposition of nine millions sterling on the metropolis, in order to purchase that consent." "WE ARE CONFIDENT THAT WE HAVE SUGGESTED THE TRUE KEY TO THE FUTURE DEALING WITH THE MATTER IN THE ACTUAL LIMITATION OF THE CAPITAL OF THE COMPANIES." Mr. Richardson's letter shows that this truth has at last been brought to the comprehension both of the Local Government Board and of the Metropolitan Board of Works; and the same may be said as to the Committee of the House of Lords on the East London Waterworks Company's Bill of the present session. The special uses which the different authorities are now endeavouring to make of this key is a subject on which we cannot now enter. But if attention had been paid to our warning, on February 14, 1880 (*Builder*, vol. xxxviii., p. 181), against "buying a pig in a poke," not only would the position of the London ratepayer and that of the consumer have been other than they are, but the consequence of taking, at that moment, a well-counselled instead of an ill-counselled step in the affair would have been one at which the range of subjects that can be discussed in these columns allows us only obscurely to hint. Late as is the recognition of the truth of our advice, it is better late than never. But it would have been no more than bare justice to acknowledge the authorship of the counsel thus tardily adopted.

PREVENTION OF FLOODS.

THE THAMES BILL.

THE numerous householders in the Valley of the Thames who have recently found their abodes invaded by the river will probably hear with surprise that a private Bill has been introduced into Parliament which purports to control the navigation and purification of the river, from the Scour springs to the sea. Not that such a control is unnecessary. The hitch is not there. The points of wonder are, first, that so important a national measure should be smuggled in as a private Bill; and, secondly, that, pending the discussion of the measure before Parliament for dealing with all the river basins of the country, this, the most important of all, should thus, if the Thames Bill pass, be excepted from the operation of the measure.

A daily paper remarks on the subject that the channel of the Thames will not be dealt with in the best mode "till we have a Parliament of engineers, with any number of millions at their disposal." We think this is a mistaken view. It is not the superabundance, but the want, of engineers that leads to the waste, or to the over-free handling, of millions. We have a case in point as to this very valley. A board was appointed by the Thames Valley Drainage Act, which was a measure perfectly distinct from the Acts affecting the Thames Conservancy Board.

The first thing that the new Board had to do was to define the limit of their district. This was arbitrarily indicated as 5 *ft.* above the level of some particular flood, which occurred in 1873. The Thames Drainage Board applied to the Ordnance Survey to draw this line on the ground. The survey officers were very long about it. It was three or four years before the Board got any plans; and in 1877, when the evidence from which we quote was taken before the Committee of the House of Lords on Conservancy Boards, nothing further had been done. But when the Bill for this very unimportant bit of work was sent in, it amounted to 4,537*l.* 10*s.* 7*d.* for an area of 55,472 acres. This is at the rate of 1*s.* 7½*d.* per acre. The survey was perfectly useless, as far as regards collecting any of that information as to the volumetric flow of the river which is necessary before any works for the regularisation of floods can be designed. This is an instance of putting the cart before the horse. If the same method were applied throughout England it would involve an outlay of upwards of 3,000,000*l.*, after the expenditure of which the unfortunate inhabitants of the low-lying parts of the river valleys would be no whit better off than they are at present.

In 1852 an Act of Parliament was passed which incorporated a body of Commissioners having authority over the River Nene from Northampton to Wisbech. A tax of 1*s.* per acre, called the outfall tax, was imposed on a part of the district, and a tax of 5*s.* per acre on another portion. There is now over the valley a mortgage of this tax; the amount has to be met, and the lowest and worst drained lands are to-day paying the most. This is another instance of beginning to make laws without previously ascertaining the facts of the case. The 1*s.* and the 5*s.* taxes were imposed over large areas, and the incidence within these areas was determined by the utility which was expected to be derived in each case. As it is, some land is now paying an annual tax of 16*s.* or 17*s.* per acre, while it is little if at all benefited by the works, as the money raised has not been enough to complete them. This is what may be expected to occur everywhere that works are commenced without complete survey and carefully designed plan of operations.

GREEK ART IN THE AGE OF PERICLES.

THE FRIEZE OF THE PARTHENON.

PROFESSOR C. T. NEWTON'S fifth lecture * of the present term on Greek art in the age of Pericles was delivered by him in the Botanical Theatre of University College, Gower-street, on Friday, the 4th inst., when he took for his subject the frieze of the Parthenon. He observed that the Greeks seemed to have possessed a wonderful power of blending in their artistic designs the actualities of their daily life with the legends of the past. Nowhere was this better shown than in the frieze of the Parthenon, which, taken in connexion with the pedimental sculptures and metopes, formed one grand poem. There might have been other poems of the same kind in marble, but that which was embodied in the sculptures of the Parthenon was the only one which had come down to us in a state sufficiently preserved to enable it to be determined what the sculpture really meant. The frieze, he need hardly say to those who had followed his description of the Parthenon given in a former lecture, was within the colonnade of the peristyle, and in exceedingly low relief, and it was lighted from below. The original idea of Stuart and other writers of the last century as to the import or subject of the frieze had been pretty generally accepted as accurate, viz., that it represented a procession in the Panathenaic festival. From prehistoric times the worship of Athene prevailed on the Acropolis, and a festival in her honour was stated to have been instituted by Erechthonius, and in connexion with it a custom appeared to have grown up of presenting the goddess with a new veil or *peplos* every year. The festival grew in importance until, in the time of Pisistratus, a greater Panathenæa was instituted and celebrated every five years, the lesser festival being continued every year as before. According to the calculations of the Athenians, the festival took place on the birthday of the goddess. A similar concurrence of birthday and festival occurred at Ephesus in the case of the goddess Artemis. Associated with the Greater Panathenaic festival were a number of games, gymnastic and musical contests, and recitations of the poems of Homer. The *peplos* or veil presented to the goddess was carried in the procession, and was no doubt a work of very considerable art in the shape of embroidery, the working of which probably employed the high-born maidens of Athens during the four years between one festival and another. Mr. Newton went on to describe in detail the various figures in the procession, in which all the citizens of Athens were represented. An essential feature in the Greater Panathenæa (of which the frieze of the Parthenon was a representation rather than of the minor Panathenæa) was the sacrifice of victims in the shape of cows and sheep, and it was apparently the custom for each colony in which lands had been assigned to Athenian *Kleruchi* to contribute one cow and two sheep to the sacrifice. These offerings of the colonies were clearly distinguishable in the frieze from the hecatomb offered by the Athenians themselves, which consisted of cows only, and were in a different part of the procession. These hecatombs were at once offerings to the gods and banquets in which the citizens took part. In the procession there were certain maidens called *Kanephori*, who carried offerings and vessels used in the sacrificial rites. The *peplos*, as well as the victims and other offerings and treasure in the procession, were escorted by the cavalry of the state, and inscriptions found at Athens told us that it was a regular duty of the youth of the city to aid in escorting the procession. Thus, in the cavalcade we saw the young men who were the pride of Athens mounted on their steeds, although it was not at all likely that the representation was meant as a literal one, especially as to costume; for while some of the horsemen were clad in armour, others were habited in thin costumes, and some, again, had no clothing whatever except a mantle flying behind them in consequence of their rapid forward motion. How differently, observed the lecturer, would an Assyrian artist have treated the same subject. He would have given to every man in the procession exactly the dress he actually wore, and the composition should have been characterised by an air of mechanical repetition and stiffness. On the south frieze it should be observed that the horsemen and their horses moved more in troops, with one leading them, and these no doubt represented the regular cavalry of the state. The horsemen on the north frieze, on the contrary, were represented as giving much less restraint to their horses, and represented, there could be hardly any question, the young aristocracy,—the noble youth,—of the city. They rode splendid horses, which were described by Xenophon as rearing up, springing forward, and dancing about as if proud of their strength, and yet perfectly amenable to the hands of their riders. The lecturer went on to say that to his mind the frieze of the Parthenon was one of the greatest pieces of art in the world, consisting, as it did, of what might be called a torrent of moving figures, all different one from another, and yet all with the same motive,—crowded and yet not confused. As to the representation of the horses in the frieze, there was nothing that he knew of, in the whole range of plastic art, to compare with it. Although Shakspeare never saw the frieze of the Parthenon, he had yet vividly described (in "Venus and Adonis") the horses which it contained in a very beautiful passage:—

> "His ears up prick'd; his braided hanging mane
> Upon his compass'd crest now stand on end;
> His nostrils drink the air, and forth again,
> As from a furnace glisters doth he send:
> His eye, which scornfully vapours like fire,
> Shows his hot courage and his high desire.
>
> Sometimes he trots, as if he told the steps,
> With gentle majesty, and modest pride;
> Anon he rears upright, curvets, and leaps,
> As who should say, lo! thus my strength is tried.
> * * * * *
> Look what a horse should have, he did not lack,
> Save a proud rider on so proud a back."

In the sculpture of the frieze of the Parthenon was to be seen this combination of proud rider and proud horse. Having referred to the chariots, and the *skaphephori* (men carrying vessels somewhat like butchers' trays containing other offerings), the lecturer made mention of the *thallophori*,—elderly Athenian citizens bearing branches of trees in the procession,—and of other figures in the cavalcade. The centre of the eastern frieze contains what is supposed to be a representation of the offering of the *peplos*, flanked on each side by a group of six seated figures, some male and some female, supposed to be deities who have descended from Olympus to be present at the birth-day festivities of Athene. Concerning the identity of the figures in these two groups, there had been much controversy, and no fewer than twenty-nine different interpretations had been put forward by archæologists, principally those of Germany. Whatever might be the correct interpretation of these groups of seated figures, there could be little doubt that they represented deities, Athene herself among the number. On that side of each of the groups of deities which was furthest from the centre of the eastern frieze was a group of standing figures, probably magistrates. There were no dividing lines between the groups of magistrates and the groups of divinities, but the inference that the seated figures were only mortals was not necessarily to be drawn from this juxtaposition. There could be no doubt, the lecturer thought, that the ground or flat surface of the frieze was coloured a deep ultramarine blue, such as he saw on the frieze of the Mausoleum as it came out of the ground, and which colouring was meant, in fact, to represent the atmosphere or space. In conclusion, Professor Newton recommended his hearers to study the remains of the frieze in the Elgin Room of the British Museum, observing that the composition, as a whole, was strikingly reminiscent of the Pindaric odes, which were continually taking the reader up and down the scale, change and movement being continual, as in the frieze, which was in itself, as he had before observed, a grand poem.

* For reports of the previous lectures of the course, see pp. 65, 152, 239, *ante*.

SCULPTURES OF THE TEMPLE OF ZEUS AT OLYMPIA.

Professor Newton delivered the concluding lecture of the term on Friday, the 11th inst., taking for his subject "The Sculptures of the Temple of Zeus at Olympia; Alkamenes; Pæonios." The lecture was free to the public, and the Botanical Theatre, in which it was given, was nearly full. The lecturer, after some introductory remarks, proceeded to notice the great marble statue of Victory, which was remarkable for its boldness. It was made to overhang or lean forward in a manner not easy to accomplish where marble was the material used by the sculptor, and this attitude was obtained by skilfully arranging the drapery so that a hinder portion of it acted as a sort of flying buttress giving support to the figure. Altogether, it was a very bold work to have attempted in any material but bronze. There were not wanting writers who had criticised this work rather severely. Overbeck, for instance, in the latest edition of his work, proceeded to pull it to pieces bit by bit, although, after all, he acknowledged that its general effect was very fine. As the work of a contemporary of Phidias, it partook, both in the treatment of the drapery and the movement of the figure, of the style of Phidias himself, and, though inferior to the productions of that master, it did not, even when placed in immediate juxtaposition with the figures from the pediment of the Parthenon, suffer so much by comparison as might be supposed. It might, therefore, be safely assumed that the sculptor who made this statue had been trained in the Athenian school. Among the ornaments of the Temple was a bronze Victory, which, we were told, stood on the apex of the western pediment, and if the sculptor was a worker in bronze as well as in marble, as had been thought, he probably conceived the idea of executing in marble a conception which had hitherto only been attempted in bronze. We were told that this sculptor made certain sculptures of the Temple of Zeus. Now the expression *acroteria*, which was used, might mean only the ornaments on the apex of the pediment, but it was more probable, the lecturer thought, that it also included the sculptures within the western pediment, which we know, on the authority of Pausanias, were made by Pæonios. The subject of these sculptures was the contest in chariot-racing between Pelops and King Œnomaus. Pelops having sought in marriage the hand of Hippodamia, daughter of Œnomaus, the king consented to let Pelops have her if he could out-run him in a chariot-race, but a compact was entered into that if Pelops were unsuccessful he should share the fate of previous suitors and be put to death. Pelops succeeded in winning the race by resorting to the stratagem of bribing the king's charioteer to remove the linch-pin from the royal chariot. The sculptures of the pediment represented the contest, according to Pausanias, just before the king's chariot came to grief. In this pedimental composition, as in those of the Parthenon, the figures at the outer angles were personifications of rivers, intended to signify the limitations of the territory on which the events depicted in the sculpture took place. Very early in the German excavations the remains of the eastern pediment were dug up. It was to be regretted that we had not yet in this country any casts of the figures in the eastern pediment, but at Berlin they were to be seen, admirably arranged. The composition of the western pediment was at present in a somewhat ragged and incomplete condition, but many fragments had been found during the excavation, so that it was possible that before long students would be able to more completely realise the original effect of the composition. But were the figures by Pæonios in the eastern pediment worthy of the splendid statue which he had referred to at the commencement of his lecture? Decidedly not. The sculpture was exceedingly bad, the horses in particular being very awkward and clumsy, and not at all like those in the pediments of the Parthenon. That was the general verdict of all who had studied the subject. It was, no doubt, a very great disappointment to all that such a verdict had to be recorded. Concerning the western pediment, we had the information in Pausanias that Alkamenes was the artist who executed it, and the same writer had given us a great deal of information,—which, if not always perfectly accurate, was still very valuable as far as it went,—concerning the work. The subject of it was the battle between the Centaurs and the Lapithæ. But the work in this pediment was characterised by the same sort of slovenliness and want of finish in execution as that of the eastern pediment, and contained nothing that accorded with the high reputation of Alkamenes among his contemporaries. Indeed, the execution in parts was hardly worthy of an ordinary stonemason, and was very inferior to the ordinary Greek sepulchral monuments of Athens. Professor Newton went on to say that he was at Olympia in 1876 with Professor Colvin, and that they agreed in the conclusions arrived at with regard to these pedimental sculptures,—conclusions which, he was happy to say, German archæologists had accepted and endorsed. Shortly stated, those conclusions were that

the pedimental sculptures afforded evidence of very great invention and originality in composition,—a remark especially applying to the sculptures attributed to Alkamenes,—but that their execution showed unmistakably the work of untrained and inferior workmen. These conclusions had been fully confirmed by Overbeck in the last edition of his work. How, then, was this inferiority of execution to be accounted for? The supposition had been hazarded that the people of Elis had not the means, or did not choose to spend the money, in paying perfectly skilled artists to execute these works with their own hands, but contented themselves with obtaining designs from Alkamenes and Pæonios for the compositions, the execution of which was entrusted to the comparatively 'prentice-hands of the native workmen. By others, it had been supposed that a given sum had been named as the entire cost of the temple, but that the chryselephantine statue of Zeus by Phidias,—one of the seven wonders of the ancient world,—had absorbed more money than was expected, so that the rest of the sculpture had to be somewhat "scamped" or relegated to native workmen. Unfortunately, we had not so much knowledge of the amount of gold used in the chryselephantine statue of Zeus at Olympia as we had of that in the Athene at Athens. In the latter there were from forty to forty-four talents of gold used, but the amount used in the statue at Olympia could only be guessed at inferentially. Lucian, in one of his curious dialogues, states that two of the golden locks of the hair of the Olympian Zeus had been stolen, and he mentions the weight of each, the value of which in gold would be 300*l.*, or 600*l.* the two. As to the form of the statue, we did not know so much about it as that of Athené Parthenos, for the only copies we had of it were on two copper coins of Elis, of the time of Hadrian. On one the god was represented seated on a chair or throne, and holding out a Victory in his right hand; on the other, only the head of the god was shown,—but these coins probably gave a very faint idea of the appearance of the statue. On the other hand, while the description given by Pausanias of the chryselephantine statue of the Parthenon was very meagre, though, no doubt, accurate as far as it went, his description of the Zeus of Olympia was exceedingly minute. Aided by that description, Quatremère de Quincy, sixty years ago, succeeded in producing what, in spite of the enormous difficulties of his task, was doubtless a tolerably correct restoration of the statue. Having entered into details concerning this statue, the lecturer referred to the metopes, the subject of which was the "Twelve Labours of Hercules," and brought the present course of lectures to a close by announcing that the summer term of nine lectures, commencing on May 6th, would be devoted to Greek and Roman sepulchral monuments and funeral rites, &c.*

* A telegram from Athens, dated the 8th inst., says:—"The German excavations at Olympia have been suspended, owing to the want of funds. According to the convention entered into between Greece and Germany, the latter is entitled to retain all ancient works of art, or other objects of which duplicates have been found. The German Government has now claimed about 2,000 pieces of marble, bronze, and pottery, brought to light by the excavators. The question is exciting considerable interest here, it being alleged that duplicates exist of only a few of the articles found. In to-day's sitting of the Chamber of Deputies, the Minister of the Interior submitted a Bill authorising a Government grant for the prosecution of the excavations."

SANITATION AS AN INCREMENT OF VALUE IN HOUSE-PROPERTY.

AN interesting paper on this subject was read by Mr. H. H. Collins, architect, at the ordinary general meeting of the Institution of Surveyors, on March 7th. We print the concluding portion of it, with one of the introductory paragraphs.

It has been urged that, notwithstanding all the efforts of sanitary legislation, the death-rate has been stationary, and, therefore, that the people have not been benefited thereby. If this were true, the deduction drawn therefrom is false. Dr. Farr has mathematically demonstrated that the health of a community is directly as their density or proximity; or, in popular language, he proves "that the nearer people live to each other, the shorter their lives." Now, the town populations in England have increased, during the last three decades, from about 9 millions to 14½ millions (probably the next census may show to 16 millions); and, if this be so, the sequence of the above law would show an increased mortality. But, in truth, it has been diminishing, for we find that the average of mortality, during the thirty years referred to, was 22·37 per thousand in England and Wales, and that from 1871 to 1877 the mortality was at the rate of 21·64, or ·73 per thousand diminution, or a saving of life of 116,800 persons in England and Wales, or of nearly 17,000 persons per annum; and this can only be attributed to the persistent efforts of sanitary science, affording the people purer air, better drainage, adequate water supply, unadulterated food, better lodging, and cheaper and, consequently, more abundant clothing. If we wish, however, to realise the improved conditions of life, let us take a retrospective glance, dating from two centuries since. Dr. Lyon Playfair has prepared a tabular statement of the death-rate of the Metropolis from 1660 to the present time, gathered from imperfect data, it is true, but sufficiently exact for my present purpose.

Thus, the annual death-rate in London,—

From	1660	to 1669	was 80·0	per thousand.
,,	1681	,, 1690	,, 43·1	,,
,,	1746	,, 1755	,, 35·5	,,
,,	1846	,, 1855	,, 24·9	,,
,,	1871	,, 1880	say 23·0	,,

But, irrespective of these facts, a stationary does indicate a lower or reduced death-rate; for we must not forget that our towns have, by immigration, been converted from mere villages into cities; that, at the beginning of this century, England contained no town, with the exception of London, exceeding 100,000; that now she has sixteen; and, as Dr. Playfair remarks, under these circumstances the causes conducing to sanitary improvement must be at least equal to those tending in a contrary direction. . . . .

In many of the old houses in the best parts of London and the provinces are still to be found basements riddled with cesspools. A member of our Institute had three removed from his house in Harley-street. In the same street a prime minister lived forty years without there being any connexion with his house and the sewer, and it was only when typhoid fever set in that it was rectified.

In Portland-place, in one house, thirteen cesspools were discovered. Mr. Rawlinson removed fifty-three from Windsor Castle.

I have had cases in my experience where not even cesspools were constructed, but where the soil was simply delivered into and upon the surface, and so deposited for some years. Examples could be readily multiplied, but *cui bono?* It will puzzle the curious inquirer in future generations to understand how any could have been suffered to exist, though it will not occasion them surprise, nor tax their understandings to realise, how they produced their terrible but natural effects. The diseases occasioned thereby will disappear, and their existence will vanish in the time to come, and will be mere matters of historical interest.

It may be objected to that the works suggested are of a costly character. I have approximately calculated the additional expenditure which would be required in the construction of a London house of usual character, having, say, 25 ft. frontage, 60 ft. deep, and containing five floors, giving a total height of, say, 60 ft. At liberal prices, the work would not entail an original outlay exceeding 60*l.* To alter such a house would cost 150*l.* at least. Allowing the builder 10*l.* per cent. on his outlay, it would demand only 6*l.* per annum to be added to the rent, a small sum when compared with the immunity from danger to life and health which it would secure. From actual and recent experience, I am able to state that any ordinary-sized house, say of rental of about 100*l.* to 200*l.* per annum, can be altered so as to be converted from an insanitary to a sanitary condition for a sum not exceeding 300*l.* This statement must, of course, be qualified to this extent, viz., that no extraordinary difficulties present themselves, but I unhesitatingly assert that in every case the expenditure need not be excessive; that in most instances it need be but moderate; that under all circumstances such expenditure will pay itself in a few years by the saving in doctor's bills, the preservation of furniture, &c., and the cheerfulness and happiness which it must and will procure.

The practice of the profession is to value property upon the principle that "a thing is worth just what it will bring," not what it is intrinsically worth. Owing to a want of education,—not only in sanitary knowledge,—but likewise in sanitary legislation,—the general public are ignorant of the commercial loss which their neglect entails. Little inducement is held out to the builder to expend money in sanitary work, when he feels that it would not be pecuniarily or socially estimated. We too often find that where sanitary improvements both in material, workmanship, and invention have been employed by a contractor in his buildings, they have not realised 1*l.* more either in rental or sale when brought into the market. A Queen Anne elevation,—some tawdry so-called decoration,—or an extra cupboard, has been far more productive of profit and far better estimated both by public and by valuer. Yet, as I have shown, sanitation forms a real and large increment of value, and should be estimated and provided for in renting or purchase of house or estate, just in the same way that its repairs and other outgoings are considered.

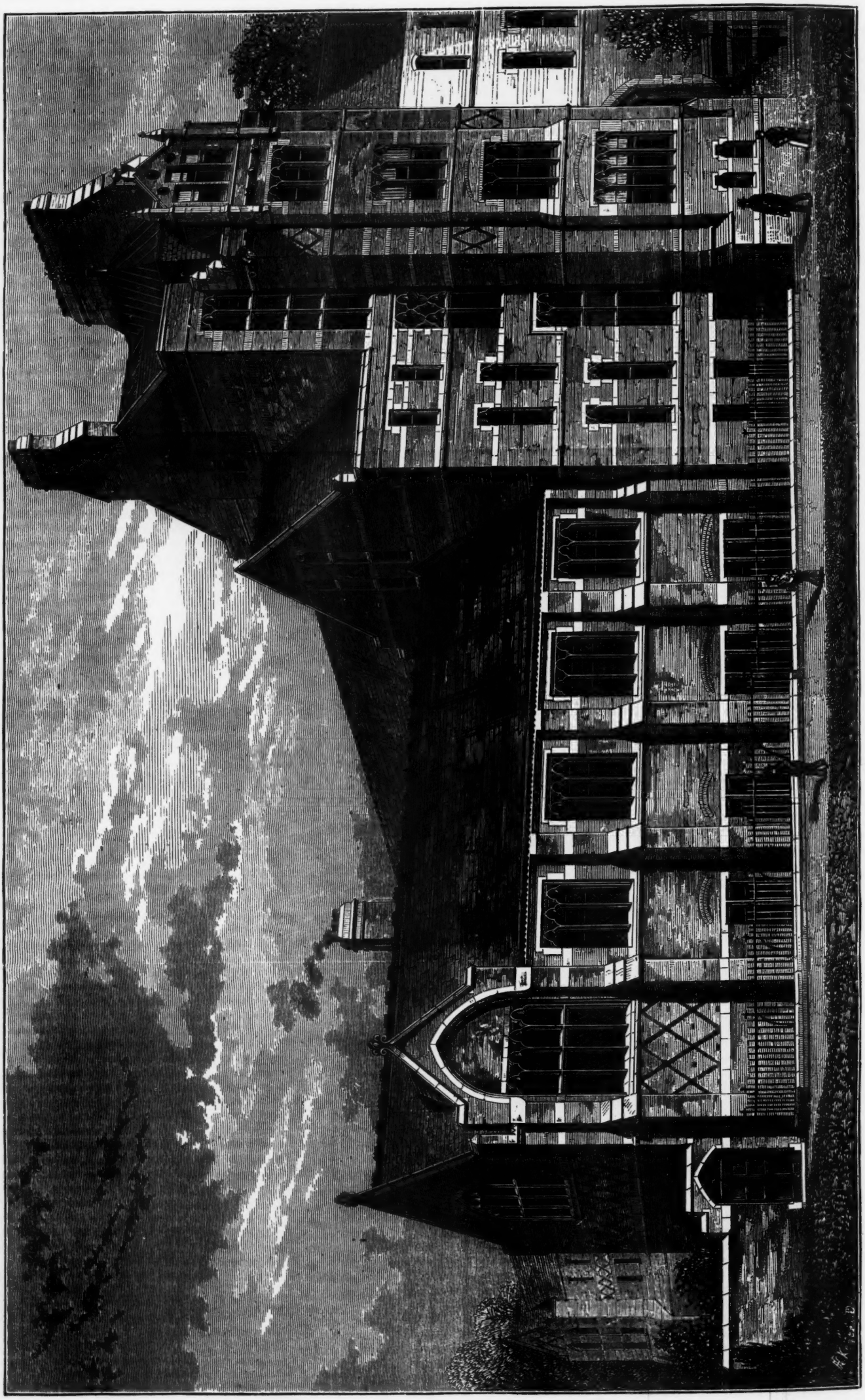
The valuer can readily estimate the increased advantages and benefits of sanitation at a money value; the enjoyment derived, and the anxiety spared from ill-health, are not so easy to calculate—they are without a tangible price. The disadvantages and evils attending a want of sanitary precaution can, with equal facility, be measured in pecuniary value; not so the trouble engendered, the oftentimes ruinous expense entailed, and the loss, perhaps, of some dear life, plunging a household from affluence to, it may be, comparative poverty, if not absolute pauperism, thus:—

The typical illustration I have drawn was taken by a client, a shrewd and clever lawyer, who was induced to accept on a lease for seven, fourteen, or twenty-one years, a new house situated in a good neighbourhood, well planned, with ample accommodation, and built by and under the supervision of an architect. It was one of a large number still unlet, and he yielded to the temptation of obtaining it for some 30*l.* or 40*l.* less rental than it was really worth. The first seven years passed happily away, but just as he had entered into the eighth year the basement of the house became flooded with sewage-water, standing to a depth of over 1 ft. His wife and children became affected with diphtheria, and his own health suffered. His medical attendant ordered him and his family to leave the house, and he was obliged to send them to Eastbourne for a lengthened period at a large expense. Called in to remedy the mischief, my client, by my advice, saw the architect and landlord,—who enlarged on the doctrine of "*caveat emptor*," remarked on the low rental obtained, and finally refused any assistance. Irrespective of the anxiety entailed,—quite beyond estimation,—the trouble involved, loss of business and peace of mind, the absolute cost has not been less than some 500*l.* Now, add this to his rent of, say, 140*l.* per annum, on a 6*l.* per cent. table for fourteen years, and it will amount to at least 50*l.* per annum (without calculating cost of repairs, &c.), or, in other words, he will be paying some 25*l.* per annum more than he would have paid had he given the original rent demanded of him, and had he taken the precaution of ascertaining the sanitary condition before accepting the lease.

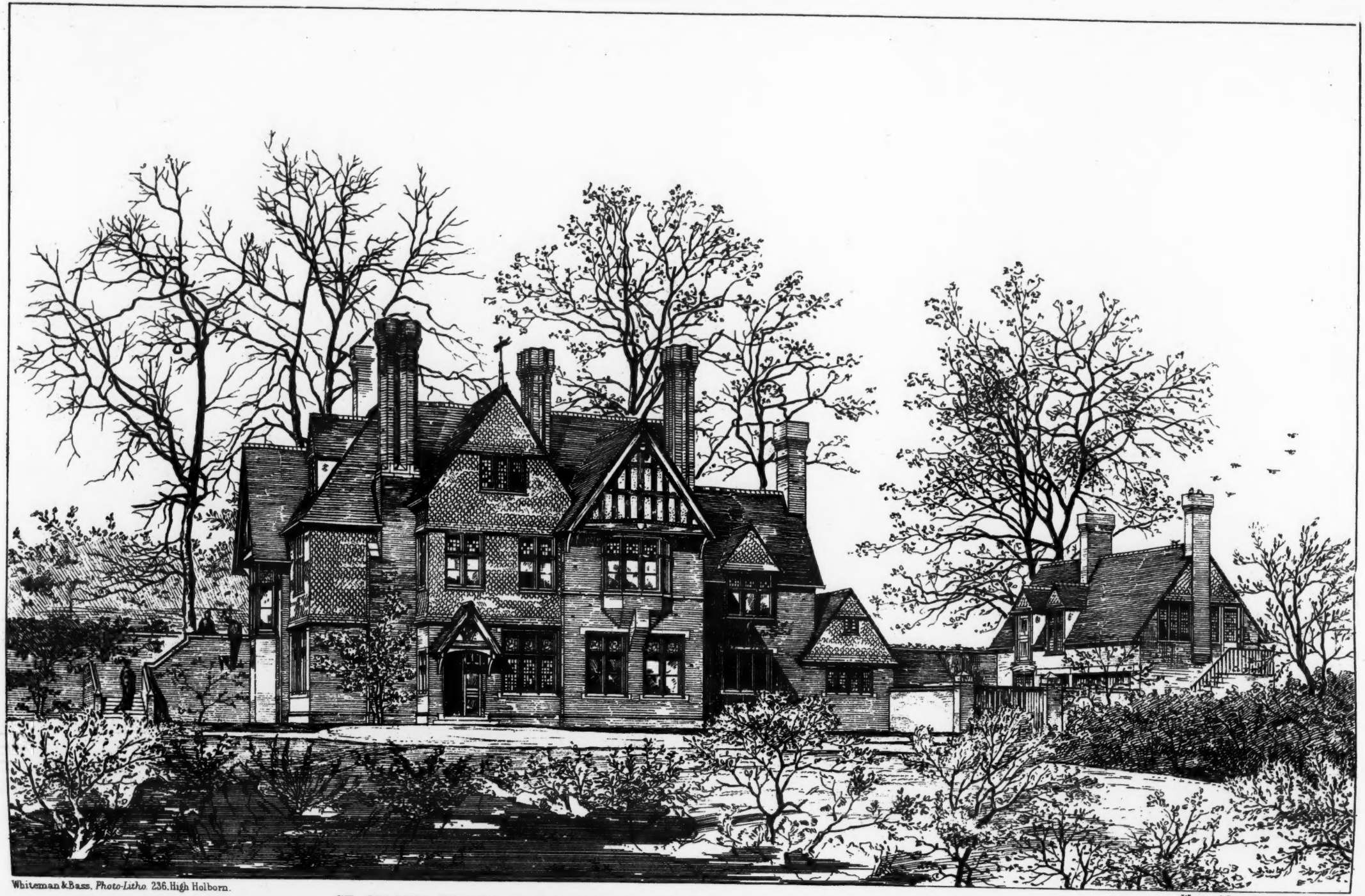
For the *present*, we do not require further legislation. In the *future*, it must proceed from an educated conviction, founded on its absolute necessity. To this Institution I look with hope to promote and to ensure such an education—by appealing, it is true, to the lower but unerring instinct of the pocket; to point out the cost incurred by neglect; to call attention of modern legislation to compulsory sanitary measures, which, if disregarded, involve penalties and serious outlays—even, in some instances, forfeiture of property itself; to bring to recollection the regulations of water companies, demanding special fittings and provisions for constant supply; to building enactments, compelling sanitary construction; to Nuisance Removal and Public Health Acts; and to the various by-laws authorised by Secretaries of State, and now being actively promulgated and enforced throughout the length and breadth of the land.

All these enactments are to be measured by money value, and will be found, perhaps, the best method of instructing the people; their worth once recognised pecuniarily, they will not be slow to appreciate their sanitary value, evinced as it will be by increased longevity, amelioration of physical condition, disappearance of disease, a lower sickness rate, the banishment of much crime, drunkenness, and misery, a diminished death, and a reduced poor rate.

To this Institution is entrusted the task of



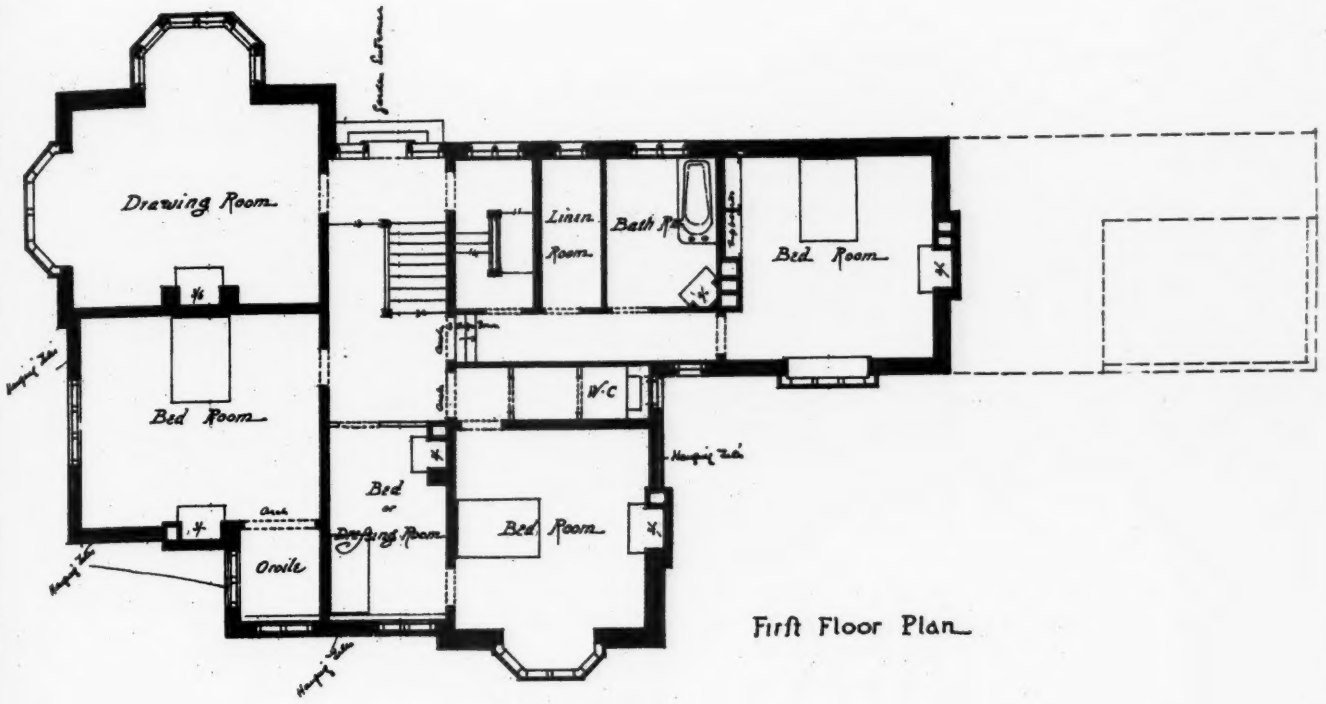
EXETER GRAMMAR SCHOOL.—MR. W. BUTTERFIELD, ARCHITECT.



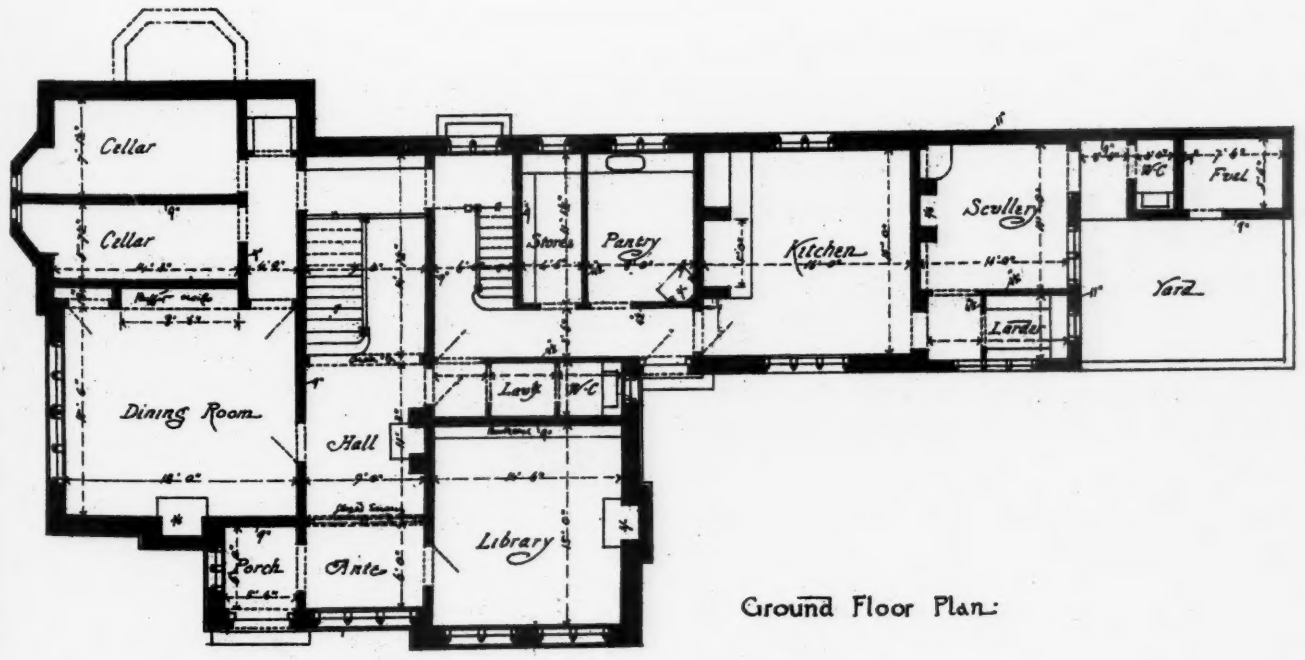
Whiteman & Bass, *Photo-Litho.* 236, High Holborn.

ST. MARY'S VICARAGE, KIPPINGTON, SEVENOAKS.—MR. JOHN M. HOOKER, ARCHITECT.

Wyman & Sons, Printers, Gt Queen St.



First Floor Plan.



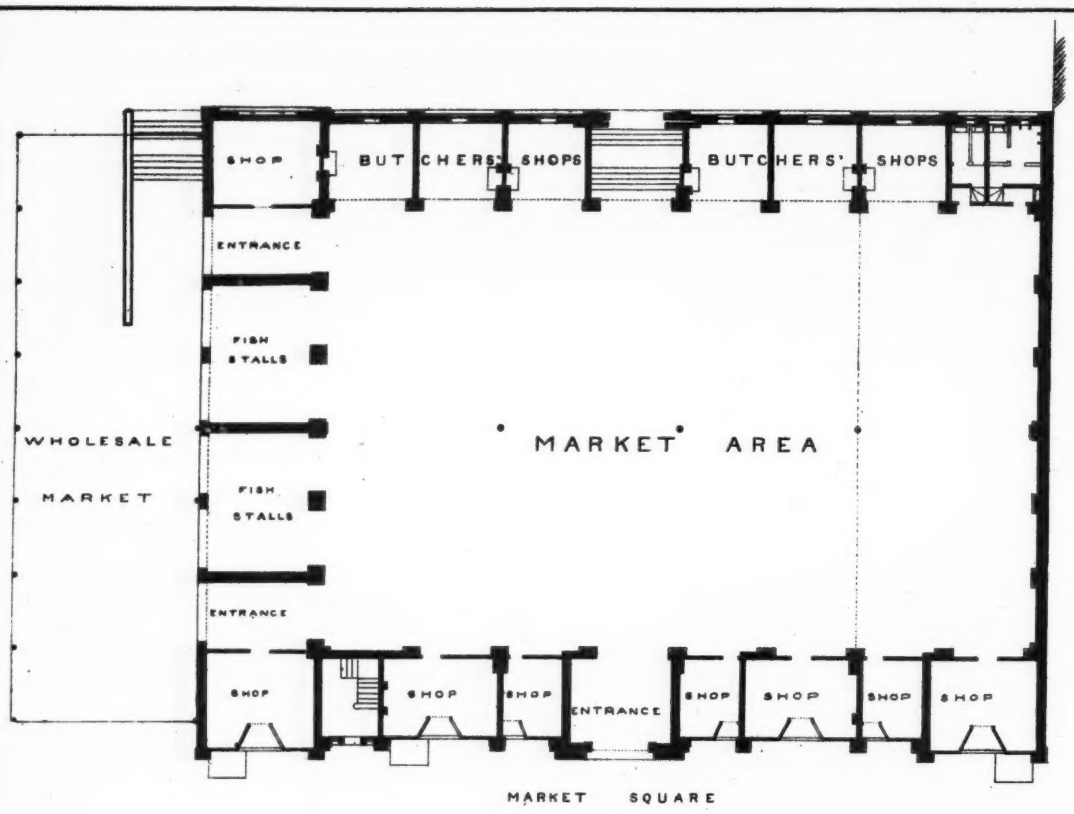
Ground Floor Plan.

J. M. Hooker. Architect

ST. MARY'S PARSONAGE, KIPPINGTON, SEVENOAKS, KENT.

Whiteman & Bass. Photo-Litho. 236, High Holborn.

Wyman & Sons, Printers, 74 Queen St.



Whiteman & Bass, *Photo-Litho* 236, High Holborn.

NEW MARKET HOUSE, OVER DARWEN, LANCASH

Wyman & Sons, Printers, Cr Queen St

N, LANCASHIRE.——Mr. Charles Bell, Architect.

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THE OPERA HOUSE FOUNTAIN, VIENNA.—Herr Von der Nüll, Architect.
The late Mr. Hans Gosser, Sculptor.

teaching the people that, if property has its benefits, it has likewise its obligations, and that, morally and legally, there is full vitality in the grand old legal maxim, "*Sic utere tuo ut alienum non lædas.*"—"That people must make use of their own property in such a manner as not to injure that of others."

A discussion followed and was adjourned to the next meeting, fixed for March 21st.

FOUNTAINS AT THE VIENNA OPERA-HOUSE.

The fountain which we illustrate is one of two placed in the two oases of green in front of the Vienna Opera-house; both show the same arrangement. From a large lower circular basin, raised a few steps, rises a membered column supporting two smaller basins. Round the upper part of the column three figures are grouped, while a fourth surmounts the whole. The fountains are after designs by Herr von der Nüll, the same artist who, with Siccardsburg, drew up the plans for the Opera-house. The statues were modelled by the late Hans Gosser, a Tyrolese sculptor, and completed by his disciples. The sculptor was not permitted to draw upon his own fancy, but was fettered by a hydra-headed committee, in which the bureaucratic element was strongly represented. The latter desired that the Germanic Muse of Song, Lorelei, was to surmount both fountains, while the three statues for the one were to be representative, respectively, of Joy, Sorrow, and Love; of the other, Vengeance, Frivolity, and the Dance. In consequence of this restriction, the artist, already battling with death, was not very successful with the latter, but the two Loreleis display unmistakable signs of his genius. Notwithstanding those drawbacks, the two fountains are of a very harmonious character, and blend admirably with the architecture of the Opera-house.

Free Exhibition, Hanover Gallery.—This Saturday, 19th inst., being the last day of the Spring Exhibition of Water-Colour Drawings, now on view at this gallery, free admission will be granted between the hours of four and eight p.m., to persons employed in the City and West-end warehouses, banks, &c., upon presentation of the card of their employers.

EXETER GRAMMAR SCHOOL.

We give, in our present number, a view of the new buildings of the Exeter Grammar School, a description of which appeared in our issue of September 11th, 1880 (p. 340). This school has been removed from the High-street in the City of Exeter into a suburb on the edge of Heavitree parish. The old site and buildings have been sold, with the exception of the materials of the chapel, which have been preserved, with a view to their being used in a future chapel. Plans have been made for the entire school buildings, but funds are only forthcoming at present for a part. The prominent features in the view are the dining-hall, with the kitchen and offices beneath it, and a lofty house, intended as apartments for assistant masters. The wing, a small piece of which is shown to the right of this house, is not yet built, but will eventually form the second side of a quadrangle in connexion with the class-rooms, studies, and dormitories, at right angles with, and concealed by, the above-named residence, all which have been already built. A chapel, that is to be at once erected, at a moderate cost, will form a third side of the quadrangle, which is to be eventually completed on the fourth side by a head-master's house.

About 19 acres of land were secured for 8,200*l.*, and the buildings have been erected, at the cost of nearly 14,000*l.*, by Messrs. Stephens & Bastow, of Bristol, from the designs of Mr. W. Butterfield, architect.

ST. MARY'S VICARAGE, KIPPINGTON, SEVENOAKS.

This house, which is now approaching completion, has been built in the newly-formed district of St. Mary's, Kippington, and is a pleasing object among the fine trees in the park.

The buildings are of red bricks, with tiled roof, weather tiling being used on portions of the upper story. The grounds are of an undulating character, and well timbered, and are prettily laid out, the old rag-stone quarry (from which the stone for the church was taken) being cleverly utilised as part of them, and it forms a pleasing feature.

The work has been well and expeditiously carried out by Messrs. Willicombe & Oakley, builders, of Tunbridge Wells, under the superintendence of Mr. John M. Hooker, the architect of the church and of the large houses on the Oak Hill Estate, which adjoins Kippington Park.

The red bricks of which the vicarage is built are of a good colour, the same inside as out, so that they look well when carved. These, as well as the pressed tiles of the roof and the finials, are from the Dunton Green brick and tile works, near Sevenoaks.

The house is built at the expense of Mr. W. J. Thompson, of Kippington, the patron of the living.

OVER-DARWEN MARKET.

The building as illustrated is in rapid course of erection, and it is expected to be opened in the ensuing autumn.

It has good frontages on three sides to streets and the proposed market square, on the opposite side of which the contemplated town-hall will stand. The central market area, as shown by plan, is 120 ft. by 60 ft., and is covered with a wrought-iron circular roof in two spans, and glazed on Rendle's system of glazing on the south side, the other portion being zinc. The butchers' shops on the south side will be fitted with all modern contrivances for hanging the meat, &c., and each shop will be lined with white glazed bricks and coloured bands the whole height.

The shops facing Market-square have frontages also to the central area; they are of different sizes for various trades, and will have walnut and plate-glass fronts; each has also a small staircase leading to a cellar below.

The principal entrance to the market is in the centre of the Market-square front, and there is a similar one from School-street. The wholesale market is on the west side, covered by an iron glazed roof. There are fish-stalls leading out of it into the general market,—to which there are also two entrances,—making four in all. The whole of the area below the market is cellared, and covered with brick vaulting on iron girders. A part of these cellars is crossed by the river Darwen, for which special precautions had to be taken by building retaining-walls to confine it, across which the main front of the market is carried on cast-iron girders.

Above the south and west fronts are a series of rooms, approached by a private staircase from Market-square, those on the south being reached by a gallery supported on iron brackets from the main wall.

The interior walls are all faced with a hard cream-coloured brick from the Silkstone Brick Company's works, relieved by red bands. The cornices, &c., are all of Darwen stone, both inside and out, the external walls being also of Darwen parpoints in narrow beds. The roofs are covered with green Welsh slates.

The floor of the cellars and market will be paved with Lowe's concrete paving.

The turret will contain a clock and bell, and the stone pediment below will have the arms of the borough of Darwen carved in it.

Mr. Charles Bell, F.R.I.B.A., of Dashwood House, 9, New Broad-street, London, is the architect, whose design was selected in competition by Mr. Waterhouse, A.R.A., in 1879. The contractors are Messrs. Orrell & Son, of Darwen, for the general work; the iron roofing, &c., being by Messrs. Goddard & Massey, of Nottingham; whilst the girders, &c., for the river walls and cellarage are executed by Messrs. Handyside & Co., of Derby. The total cost will be 20,000*l.* Mr. Hobson Haigh is the clerk of works.

THE ARCHITECTURAL PRESS IN GERMANY.

Our readers will remember that a great controversy has recently been going on in Prussia respecting the comparative merits of English and German architecture, especially with regard to their relation to the State. A Prussian deputy, Dr. Reichensperger, has made himself the champion of the English as against the German system, and has been the object of very severe criticism, especially from official writers in the press of his own country in consequence. One of Dr. Reichensperger's objections to the German system was that it tended to crush freedom and freshness of architectural creation. The hand of Government, reaching everywhere, was leading to a dead monotony and uniformity of production. The architectural and building professions suffered from the incubus of the vast army of officials who are every day encroaching more and more on the domain of private enterprise. This great hierarchy of officials reminded Dr. Reichensperger of the state of affairs prevailing in every branch of human pursuit in the Flowery Kingdom, and the indignant legislator declared that his fellow-countrymen were rapidly sinking to the level of a form of government that he called mandarinism. Whatever may be thought of Dr. Reichensperger's opinions, there can be little question that in this he has hit on one of the weak points in the public life of his country.

A singular instance of the German tendency to mandarinism has come to light within the past few days. Hitherto the only periodical publication connected with the Prussian Ministry of Public Works was a monthly magazine, and it has now been determined to bring out an official weekly paper for building and architecture, of which organ, strangely enough, Herr Sarrazin, a German building official, who has been Dr. Reichensperger's severest critic, is to be the first editor. An edict has been issued by the Minister of Public Works, prescribing the functions of this journal, and ordaining the behaviour of the official members of the profession towards the new publication. The terms of this decree certainly appear to confirm some of Dr. Reichensperger's apprehensions.

In the official circular dated January 17th, and issued to all the numerous classes of Government architects, Government builders, Government architectural counsellors, Government building inspectors, and the rest, the Prussian Minister of Public Works ordains as follows:—After announcing that the Government intends from the 1st of April next to publish a weekly paper on building as its official organ, which is to be called the *Central-Blatt der Bauverwaltung* (Central Journal of the Building Administration), the Minister says,—"In connexion with this organ I direct that the whole of the building and architectural officials of Prussia are required to send to the (Government) *Building Magazine* or to the new (Government) *Central Blatt* all news they may wish to publish on any structures, contemplated, completed, or in process of erection by the Government, or on any buildings whose cost is partly defrayed by the Treasury. They are to proceed in the same manner with all scientific articles they may write on building and architecture the materials for which they have obtained in the exercise of their office under Government assistance. At the same time, it is my desire that these two publications should be used by all building officials to bring out any private articles they may write on similar subjects. In regard to the honorarium to be paid to them, they may arrange with the editors of the periodicals in question. As it cannot be determined beforehand which of these papers the said news and articles may be most suited for, all communications are to be sent to the editor of the (Government) *Building Magazine*. Communications that are not accepted for publication will be returned as soon as practicable, and in this case the writers are at liberty to publish them in any other way provided they first obtain my sanction. Further, I hereby direct the said officials to send to the advertising department of the new journal all advertisements referring to the erection and repair of buildings, the terms of contracts, the supply of materials, the employment of technical assistance, &c., and all advertisements whose publication is desired in the interest of the State. These advertisements, which the publishers are bound to accept at 3½d. a line, are, however, to be cut down as short as possible with a view to save expense."

This remarkable ordinance has not unnaturally raised a storm, not only amongst the non-official world of architects and builders, but also even in the ranks of Government officials themselves. What the independent critics of the profession think of the measure may be gathered from some comments appearing in one of the most esteemed organs devoted to this class of subjects: we refer to the *Deutsche Bau-Zeitung*. While allowing that the Minister may be within his rights when prescribing the conduct of officials in regard to the publication of facts gained in their official capacity, the *Bau-Zeitung* says, justly enough, in reference to the private writings of Government servants, that "when the Minister merely expresses his 'wish' as to how the official writers should act, everybody acquainted with official affairs knows that such a wish cannot but be regarded by those concerned as a command. Indeed, the wording of the edict seems to imply that even private contributions, after being rejected by the two official publications, require the Minister's sanction before they are permitted to be published in non-official journals. And even if Government servants, belonging to the profession, do not spontaneously hold aloof from all literary work on architecture and building, they will, the *Deutsche Bau-Zeitung* thinks, find plenty of meddling and pedantic superiors who will soon enough do their part towards depriving them of any pleasure or interest in it.

The same journal proceeds to remark that the minister, in signing this ordinance, failed to realise the consequences of it from a business point of view. "The *Zeitschrift für Bauwesen* (building magazine) and the *Central Blatt* are not strictly official organs in the same sense as the *Staats-Anzeiger* (the *Gazette* of Prussia). The receipts and expenditure of the *Gazette* figure in the national Budget. In the other cases, the State is only connected so far as it supplies editors and official materials, receiving in exchange a certain number of copies of the two publications. In all other respects the latter are, from a business point of view, purely private speculations on the part of a certain firm of publishers, who are, or will be, in competition with other private firms. When, therefore, the Minister of Public Works requires the officials under him to devote their literary labours to those two publications he is really creating for them a sort of monopoly. He, in fact, throws the entire weight of his official influence into the scale on their behalf, and acts as agent for the business interests of the publishing house in question. It is surely superfluous to adduce any further considerations in order to show the inadmissibility of such proceedings, or to point out the consequences which would ensue if all the other departments of the Government acted in a similar manner."

The Moorswater Viaduct, on the Cornwall Railway below Liskeard, has been opened. The viaduct is 150 ft. high, 800 ft. long, and has cost 30,000*l.*

LEGISLATION AFFECTING DWELLINGS.*

ALL laws relating to construction should be simple and general, and should require some well-ascertained minimum of strength. There is this special difficulty about such laws, that they may prove entirely inefficient, owing to defects in the materials employed; and this difficulty cannot be fully met by the efficiency of official surveyors. But it is not desirable that it should. Neither the regulations nor the character of the inspection should be such as to relieve builders from the fullest responsibility in connexion with their work; because the best rules and the fullest supervision would prove but a poor substitute for such responsibility and the protection afforded by the common law. Keeping this in view, there need be little difficulty about such rules; nor can there be much doubt about the propriety of giving local authorities more power than they at present have to protect the lieges from such accidental dangers as may result from falling chimneys and chimney-cans, slates and signboards,—not to mention "banners on the outward walls,"—from insufficient means of egress from public buildings, the want of fireproof construction in certain circumstances, the want of sufficient means of escape from fire in places of public assembly, hotels, factories, large flatted tenements, and the like. The propriety of such regulations is readily seen, and with the aid of professional advisers there need not be very much difficulty in arranging the details.

But when we turn to a second class of subjects, those relating to dangers to the community arising from objectionable sanitary arrangements, we find ourselves at once involved in a labyrinth of perplexities. In dealing with the first-class of regulations it is admitted that the aid of experts is necessary, and perhaps most people will agree that in dealing with the second the guidance of experts is not less advisable. The mischief is that there is a perfect crowd of most miscellaneous character, all claiming to be experts in sanitary science, from the eminent doctors who, especially in London, give advice on such subjects,—and not gratuitous advice by any means,—down to the practical plumber who writes upon his card, "Sanitary Engineer." One would naturally suppose that the public would turn to architects for advice about sanitary matters connected with dwellings, but it is not so. Apparently that would not suit the eminent doctors, whatever the plumbers may think about it. The architects must be sat upon, blackguarded, lectured, blamed, or, it may be, pitied as men who have been asleep for the last twenty years, and are only now beginning to wake up to realise and understand the duties which devolve upon them in connexion with one of the most important departments of their proper work. Now, I do not hesitate to say, without fear of contradiction, that during the last quarter of a century architects have not only kept abreast, but considerably ahead, of sanitary specialists, and have both practised and preached, years ago, doctrines which these, in the ignorant rashness of (comparatively) juvenile enthusiasm, so constantly parade before the public as original, unheard-of-heretofore, things that architects never pay any attention to, and, in fact, know nothing about. But the truth is that architects were among the very first to advocate the erection of improved dwellings for the poor; to point out the dangers arising from the general introduction of water-closets; to demonstrate the importance of flushing and ventilating sewers and drains, and of cutting off the connexion between drains and dwellings; and certainly the first to show a practicable method of doing so. Excuse this slight digression. To modern sanitarians, especially medical men, we are greatly indebted for throwing light on certain scientific aspects of the question, and for their zeal in arousing a lethargic public by appeals to self-interest, as well as to common sense. They cannot possibly do too much in the way of enlightening public opinion, for without that progress is impossible, let the few preach as they may. Far be it from me to under-estimate their services; but this I say, let them be kept in their proper place, and that is not the architects' place; and let them cease to disparage those who must have the practical direction of all sanitary works connected with dwellings,—those, I must add, who have anticipated them both in sanitary theory and practice.

But, after all, we are fellow-workers, and the advice of the medical sanitarian and the practical sanitary engineer, not less than that of the architect, is required by sanitary legislators to enable them to ascertain what is *absolutely necessary*.

There are, however, two kinds of legislation affecting the sanitary condition of dwellings. The one deals with the arrangement and construction of the dwelling itself, the other with the use of it and the conduct of those who dwell in it. The first would be provided for by a general Building Act, and the other by a Public Health Act; and it would, I think, be a mistake to mix up these two in any way. Indeed, I would advise that, in the event of any amendment of the existing Health Acts, certain clauses referring to the arrangement of buildings should be deleted, and that everything of that sort should be embraced in the Building Act. But I must at present confine my remarks to the other branch of the subject, and endeavour to illustrate what I mean by *necessary* regulations as distinguished from such as are merely desirable or expedient. I shall do so by a brief reference to some of the regulations which our Town Council sought to have sanctioned by the provisional order already referred to. The reception which these regulations met with by influential sections of the community shows the extreme difficulty of dealing satisfactorily with such matters, and the impolicy of attempting to do so without due recognition of the important interests involved and due consultation with those more immediately affected. It will be generally conceded that any Building Act must contain regulations for securing a sufficient amount of "free space" for light and air in all populous places. Such regulations will unquestionably interfere with the right of individuals to do what they like with their own, but the reasonableness of such interference for the general good is readily recognised. The difficulty arises when we begin to define "sufficient" free space. On such a question there is room for great diversity of opinion. Now, in framing the regulations referred to bearing on this point, our authorities were apparently quite satisfied that such diversity of opinion did not exist, or, if it did, that it had no business to exist, and ought to be ignored; and further, having, upon quite inadequate grounds, adopted a theory that the erection of what are called "hollow squares" was incompatible with the proper distribution of free spaces, they refused to listen to any representations to the contrary, and endeavoured to force upon the community regulations of an extravagant, and, therefore, objectionable character. This, I say, is an illustration of the kind of action in the way of curtailing freedom which a community is bound to resist. Again, it will be generally admitted that in densely-populated districts overcrowding should be prohibited. Such overcrowding, being detrimental to society, must not be allowed. But when does overcrowding reach the dangerous point, and how is it to be prevented? Our authorities say that to prevent overcrowding to a dangerous extent, every sleeping-room must contain 400 cubic feet of space for each occupant. Now, personally, I do not consider this demand excessive; but the promoters of the proposed building regulations did not attempt to show by any reference to actual experience that this limit was absolutely necessary. This, I conceive, they were bound to do, as the proposed change from 300 ft. to 400 ft. affected a large amount of valuable property, and, of course, it is admitted that in either case the health of an individual occupying such a limited space depends upon proper ventilation. But, assuming that it is right to restrict overcrowding to this extent, it by no means follows that houses must be built so that this shall be attained by making the height of all ceilings not less than 10 ft. That is really how our authorities thought it should be done, and no arguments were able to shake them out of this delusion. Now, I conceive that in building regulations no reference to this question of overcrowding is at all necessary or admissible. A man should be at liberty to make the apartments in his house of any shape or size he thinks proper, without interference. It is perfectly clear that he can do so without injuring his neighbours in any way, and the contrary is the only excuse, as we have already seen, for his neighbours or their representatives interfering with him. The utmost care should be taken that any Building Act should be kept free from such restrictions. Of course, when you come to deal with the *occupation* of the house, that is quite a different affair; but, being a different affair, it ought to be kept separate and distinct, and should be the subject of separate legislation under a Health Act. The advantage of such classification does not seem to be recognised; but it is most important for administrative purposes, if for no other. What I wish now to point out is, that any mere combination of stone and lime, however eccentric, employed in the formation of separate apartments does not affect the general health, and it is outside the scope of any Building Act to interfere with anything of the kind. But if the house cannot be healthily occupied, society is entitled to protection from the consequences of the builder's folly, and the occupation of the house must be prohibited. But it is clear that all questions as to the healthfulness of the house, and the number of persons who may safely be allowed to occupy it, are health questions, and must be dealt with by a Public Health Act, the provisions of which must be enforced by a totally different class of men—or rather, by men with quite different qualifications—from those which are required in Building Act officials. Of course, the strict enforcement of necessary rules prohibiting overcrowding would lead to the erection of healthy dwellings, because it would not pay to erect anything else. But unfortunately there is, as I have already hinted, more danger of unnecessary rules, needlessly interfering with individual freedom, being introduced into a Health Act than into a Building Act, the difficulty in obtaining precise results, owing to the complexity of the influences affecting health, leaving free scope for misleading theories and the wild prejudices of enthusiasts. This stipulation as to the height of ceilings illustrates exactly what I mean. It is, as I have said, inadmissible in a General Building Act, but it is equally inadmissible in a Public Health Act. It is, indeed, asked on the ground that it is necessary for the public health, and on no other; and in a Public Health Act it would probably appear somewhat in this form:—"It shall not be lawful to let or to occupy for the purpose of a dwelling any apartment the height of which measures less than 10 ft. from floor to ceiling." Put in this direct way, the preposterous nature of the demand can hardly fail to be recognised. It is the merest nonsense to say that no dwellings having less than 10 ft. height of ceiling are fit to live in, or in any respect dangerous to the public health. At the same time, such an uncalled for restriction would affect the value of existing buildings to an enormous extent, and greatly increase the cost of new buildings,—both serious evils to the community. It may be safely said that in this, if in any case, the community are entitled to absolute proof that the regulation is necessary. Now, no proof was forthcoming. A number of witnesses examined before the Sheriff gave it as their opinion that a room with 10 ft. height of ceiling was better than one with less height, while others asserted that, assuming the cubic contents of the rooms to be the same, a lower room was not merely as good, but better. Of course, it cannot be proved that rooms with lower ceilings are unhealthy; on the contrary, it can be proved by thousands of examples that they are pefectly healthy, the healthfulness not depending on the height at all, but on the cubic capacity and the completeness of the ventilation.

At the risk of seeming tedious, I must explain this a little more fully, because I cannot, within the limits of this paper, refer to other objectionable sanitary regulations, and I shall treat this one as typical of the kind of regulations which ought not to be tolerated. As a witness for the objectors to the proposed provisional order, I gave it as my opinion that a working man's dwelling was not only as good with an 8-ft. ceiling as with one 10 ft. high, but better,—the cubic capacity of both being the same, of course. Now, here, where there is freedom of debate, and I am open to correction, I wish to repeat that opinion, and explain more fully my reasons for it. The principal reasons are these:—1st. The low dwelling would be more easily ventilated. 2nd. It would be more commodious. 3rd. It would be cheaper. These are all good reasons why, from a sanitary point of view, the low-ceilinged house should be preferred; but, in that connexion, no doubt the

* From a paper on this subject read by Mr. John Honeyman at a meeting of the Architectural Section of the Glasgow Philosophical Society on the 9th inst.

first is the most important, and it is the one most strenuously denied.

Now, in considering the means which are available for the ventilation of an artisan's dwelling, it cannot be too constantly borne in mind that these are necessarily of the simplest character. Machinery of any kind is inadmissible, even such simple machinery as an Arnott valve. Further, it is impossible in such a case to deal with the ventilation apart from the question of heating. The air of the dwelling must be warm as well as pure; both the warmth and the purity are essential to health, and what we have to determine now is the form of room which shall make the attainment of these easiest in the circumstances. Now, if, as we have seen, it is the case that ventilators are systematically shut up, it will, I believe, be conceded that the only ventilator we can depend upon is the chimney. Even the room fireplaces are frequently filled up, but the kitchen fireplace is free, and very often forms the only ventilator in a house of several apartments. But the upper portion of a room is not ventilated by an open fireplace, except to a very limited extent.

If the room is high it is not ventilated at all, and the *thoroughness* of the ventilation simply depends on the distance of the ceiling above the door lintel. If the ceiling is close to the lintel the room will be thoroughly ventilated, and if it is high above it it will not be well ventilated,—that is, if we are to depend, as apparently we must, on the chimney for ventilation. Of course, there are good reasons for making the ceiling more than 7 ft. high, altogether apart from sanitary reasons. All I insist upon here is that *for these reasons alone, and subject to the conditions noticed*, the low-ceilinged room is distinctly better than that with the high ceiling.

But it may be urged that a room with a high ceiling would be better ventilated than the other if it were provided with a ventilating opening at the ceiling. That is denied. It is in evidence by these very advocates for high ceilings that such an opening would certainly be shut up. However, let us suppose that it would not be shut up. Would the room then be better ventilated than a lower room without such an opening? Certainly not. For, observe, if there is an opening, it must open into something. Now, what would it be opened into? Into the chimney-flue, or into a special ventilating-shaft. If the first, then one or two things would happen; there would be a draught through the ventilator, or there would be none. If the air is drawn rapidly from the ceiling the room will be cold; if there is no draught the room will be filled with smoke; and, after all, the opening will not allow a greater number of cubic feet of air to pass through the room per hour than if no such thing existed, the only difference in that respect being that part of the air which would otherwise enter the flue by the fireplace will enter it at the ceiling, necessarily diminishing the draught at the fireplace and increasing the risk of smoke. But if an opening into the smoke-flue is objectionable, an opening into a special ventilating-shaft is still more so; because, if the chimney has a good draught, the ventilating shaft would certainly have none *upwards*, and the occupants would be perfectly justified in abutting it up, as they would certainly do.

There is less objection to a ventilator at the ceiling conveying the heated air by a pipe down to the fireplace, and discharging it there,—the only objection, indeed, being that such a ventilator not only abstracts vitiated air, but heat. It is a mischievous popular delusion that the upper part of a warm room is full of foul air. It is nothing of the kind. The warm foul air is there, of course, but, what seems to be constantly ignored, the warm *pure* air is there also. Surely no one in his senses would propose that the occupants of a room are to be dependent for warmth on radiant heat! And yet it practically comes to that if you ventilate the room from the ceiling,—you inevitably carry off both the foul air and the warm pure air. I am anxious that this should be thoroughly understood, and must turn to the black board to aid me in explaining it. We are too apt to forget that both hygienic and economical considerations forbid us to waste heat. The cheapness of fuel is, like many other things, comparative. To the wage-earning class generally the cost of the annual consumption of coal is not a trifling matter, while in the abodes of poverty it rises to a question of primary importance, and the sympathetic mind recoils from the contemplation of that untold anguish of the destitute, crouching by the whitening ashes, when the alternative seems to be *cold* or *starvation*. Such cases have come under the notice of most of us, and surely I may assume that you agree with me in this,—that no contrivance for the ventilation of the humbler class of dwellings is tolerable which necessitates the waste of heat. A ventilator at the ceiling, as we have seen, must do so, and the amount of waste will just be in proportion to the efficacy of the ventilator. But the waste will be greater in a high room than a low one, because the supply of fresh air coming in chiefly round the window and door in the low room will come more into contact with the hottest stratum of air than it will in the high room, where the hottest stratum will be out of its reach.

But we must not lose sight of the fact that neither from the high nor from the low room can one particle of air be abstracted which has not been first admitted. The admission of a sufficient supply of fresh air, indeed, is the grand difficulty; and the question now remains, whether does a high or a low room offer the greatest facility for the admission of fresh air with due regard to the comfort of the occupants? Here, again, you will readily see the superiority of the low room; for, assuming that the supply gets in only by the usual channels to which I have already referred, it will at once be generally diffused throughout the whole cubic contents of the room, and will, therefore, be rapidly warmed, and prevent stagnation in any part of the room. Whereas, in a high room, only a certain proportion of the cubic contents will be affected at all, and the air will traverse a shorter distance than in the other case, and through a colder stratum of air. In most dwellings it is desirable that the occupants should not be dependent on the bad workmanship of windows, doors, &c., for their supply of fresh air, and a simple method of augmenting this casual supply has been suggested,—I mean, cutting a bit off the top of the door. Probably nothing else is practicable. Let us suppose it applied to the two forms of rooms we have been comparing. Again, we find the superiority of the low room; for the reasons which I have just said apply to the admission of air in the usual way, with this additional point in favour of the low room, that the heating of the fresh air would be accelerated by contact with the hot ceiling.

But I must pass to the second point. The low-ceilinged room would be more commodious than the other. To demonstrate this it is only necessary to give one illustration. In the case of a room which must have 1,600 cubic feet of capacity, if the ceiling is made 10 ft. high, the area of the floor would be 13 ft. by 12 ft. 4 in., whereas, if the height of the ceiling is only 8 ft. the area would be 16 ft. by 12 ft. 6 in., or a gain of 40 superficial feet; and I need not occupy your time by referring to the importance of elbow-room in apartments which must be used for such multifarious purposes as the kitchens of our artisans' dwellings. But I must make a few remarks on the third point mentioned,—namely, that the low dwelling would not only be better ventilated and more commodious, but that it would also be cheaper. This does not so readily appear at first sight. A low building would be rather cheaper than a high one having the same capacity; but the difference would not be material, and the stipulation would affect the cost of dwellings chiefly by preventing the most economical use of building ground. For example, taken with other regulations as to free space, &c., it would limit a tenement to three stories in height, and this would increase the rents in a twofold way,—first, because the cost per house would be less if the tenement were four stories high; and second, because the proportion of ground-annual or feu-duty applicable to each house would also be less. Thus, if a man could only put nine houses on a piece of ground costing 30*l.* per annum, he would require to get from each towards the ground-rent about 3*l.* 6*s.* 6d., whereas if he could put twelve houses on the same piece of ground this charge would be only about 2*l.* 10*s.*, and as we have seen that the four-story tenement would be cheaper per house than the three-story one, it is clear that the houses in the latter must be at least 1*l.* per annum dearer than in the former, and the addition of another story would, of course, make the difference still more marked. Now, I need not occupy the time of such audience as this by insisting upon the benefits of cheap houses. I am sure you will agree with me that it would require a very clear demonstration of sanitary necessity to justify any interference with property which would have the effect of raising the rents of artisans' dwellings, and still more of the dwellings of the very poor.

In the present instance nothing of the kind can be established. It will hardly be credited, and yet it seems to be the fact, that this proposal as to the height of ceilings was made regardless of these considerations, as an easy means of reckoning what should be the free space between tenements, and for the purpose of curbing that *bête noire* of urban sanitary reformers, "density of population." Now such oblique legislation is altogether unjustifiable. It is the height of absurdity to prescribe regulations which shall make the workman's dwelling less healthy, less commodious, and more expensive, to gain other ends of secondary, indeed questionable utility. Let these things be dealt with separately and directly if a good case can be made out for dealing with them at all. I do not, of course, mean to say that free space is a matter of secondary importance absolutely, but the exact distribution of free space proposed to be secured in this roundabout way is not desirable, and we would probably find that a district with wide streets and squares and considerable irregularity in the distribution of space otherwise would be healthier than one with the same proportion of free space exactly sub-divided and apportioned to the various dwellings. This question of distribution, it must be admitted, is a difficult one, and it is further complicated by an element too seldom taken into account, but most important in this climate,—I mean the relation of the spaces to the meridian and direction of the prevailing winds. Thus, suppose that in a given district the total free space required was equal to 60 ft. before and 60 ft. behind every tenement, it would not be advisable so to distribute that space, but it would probably be more conducive to the health of the district if the spaces running north and south were made only 40 ft. wide, and those running east and west 80 ft. wide. But passing from this, consider for a few minutes the other object of this indirect legislation,—the prevention of density of population. I entirely differ from those who maintain that great density of population is necessarily an evil.

But, I may be asked, why take so much pains to prove that it is possible to erect many-storied tenements of low-ceilinged houses so that they shall be healthy dwellings? Are you not thereby throwing a stumbling-block in the way of those who earnestly desire to see the dwellings of the poor improved? Far from it. It is the earnestness of my desire to see the dwellings of the poor improved which has induced me to address you here to-night, and because I wish to raise my protest against the enactment of mischievous regulations which must inevitably render every effort to improve these dwellings abortive, by making it impossible for any one to erect them profitably. Surely I need not say that unless dwellings for the poor and for the wage-earning classes generally can be erected so that at moderate rents they will yield five per cent., it is vain to expect that such improved dwellings will ever be erected even by wealthy philanthropists. In regard to this matter I wish to be practical, and to show what can be done safely and profitably if needless interference is withheld. Two years ago Sir James Watson read a paper on our city improvements at a meeting of the Royal Institute of British Architects. Sir Sydney Waterlow, Mr. M'Cullagh Torrens, and many others well known in connexion with the improvement of artisans' dwellings, were present, and being also there, I took the opportunity to ask if the improved dwellings in London could have been erected subject to such regulations as were sought by the Corporation of Glasgow as to the height of ceilings, free space, &c., and the unhesitating answer was that *they could not*. Those dwellings, so great a boon to the metropolis, could not have been erected so as to pay, and they would not have been erected.

Ryde.—A new hall and other erections have just been completed in this town for the Odd Fellows, on the site of the Nag's Head Inn, which was purchased and pulled down for the purpose. The buildings contain, on the ground-floor, stores, kitchen, and other offices; and on the upper floor a hall with gallery at its eastern end 70 ft. by 24 ft., together with retiring-rooms and lavatory. The total outlay has been about 3,200*l.* The architect was Mr. Thomas Dashwood, and the builder Mr. J. Barton.

SOCIETY OF LADY ARTISTS.

THE Lady Artists have brought together in their gallery, 48, Great Marlborough-street, Regent-street, 764 paintings and drawings, and two small pieces of modelling. Without showing any pictures of supereminent merit, the collection includes a number of very agreeable and clever works. The institution is eminently worthy of support; it serves as a valuable nursery, and affords encouragement to ladies who are striving to acquire a power by the exercise of which they may honourably support themselves. Many of the members have, of course, passed that stage, and are known and appreciated as artists. Without attempting to examine the pictures *seriatim*, we look to a few of the productions of some of the most active and longest attached members, and find them quite up to their usual mark. Miss Margaret Rayner sends a number of her admirable presentments of town views and architectural subjects; Miss Freeman Kempson, several charming landscapes and bits of the sea. Mrs. Marrable occupies one of the posts of honour with "Palm Trees on the Island of Capri" (190), and sends a number of other landscapes, including a sketch interesting to some of our readers, "From the Study Window of the late Sir Digby Wyatt, Dimlands, South Wales." Mrs. Cooper shows the variety of her talent by sending a forcible landscape (120), a "Goldfinch," and an admirably executed miniature on ivory (717). Miss Louise B. Swift is less fully represented than usual, having been studying in Rome.

"An Idle Hour" (185), by Mrs. H. Champion; "Cadgwith, Cornwall" (247), Mrs. Val. Bromley, a clever presentation of water and rock; "Citoyenne" (287), Miss E. M. Scannell; "O Salutaris Hostia" (315), Sophia Beale; "The Melon Seller" (533), by Miss Beresford; a bright and well-painted little "Head" (649), by Miss Florence E. Graham, and "Ariel's Song" (690), by Mrs. W. Barnard, very cleverly grouped, but a little stagy, deserve attention. Of decorative panels we have some effective specimens from Mrs. Jopling, Mrs. A. Lukis de Guerin, and Miss Edith Marrable, who shows good improvement. Miss Hepworth Dixon and Miss Ella Hepworth Dixon have been working away, the latter "In the Bois de Boulogne"; Mrs. Croudace sends a portrait of Captain Fawcett at the age of 90; and Mrs. C. J. Freake, to show that the excitement of amusing other people does not wholly absorb her, sends "A Calm," No. 758.

CHEAP CHURCHES.

ARCHITECTURAL ASSOCIATION.

IN the discussion which followed the reading of Mr. William White's paper* on this subject,

The Chairman (Mr. E. B. I'Anson, vice-president) said that Mr. White had given the Association a most interesting paper, full of instruction. He had touched upon the subject at a most opportune time, for large and populous neighbourhoods were rapidly springing up all round the metropolis, and in the vicinity of all the most important towns of the kingdom. Those neighbourhoods needed churches, and, as a general rule, such churches must necessarily be cheap, or they would not be provided at all. Mr. White had abundantly proved by his works that cheap churches need not be nasty ones.

Mr. Aston Webb said that he and the other members of the Association were deeply indebted to Mr. White for his paper, showing as it did how the best architectural effect might be obtained with a given minimum expenditure where funds were inexorably limited. At the same time, it was his (the speaker's) own feeling and, he thought, that of the members generally, that, as Mr. White had himself admitted, the building of cheap churches (however good they might be of their kind) was not to be encouraged wherever it was at all possible to raise the funds for the erection of costlier but at the same time more durable and monumental buildings. Where such cheap churches were built they should, he thought, rather be regarded as makeshift or temporary buildings for mission purposes, and wherever and whenever it was possible more permanent buildings should take their place. There were, he need hardly say, three ways in which a church built on architectural principles could be cheapened,—in its plan, in its construction, and in its ornament. With regard to planning, Mr. White had given in the paper some information which would be new to some of the members. It would surprise some of them to hear that the plan of having a nave and aisles was cheaper than erecting a church in one large span. One method of planning which Mr. White had not touched upon was the Welsh arrangement of dividing the church longitudinally by an arcade down the centre of the building, so forming, as it were, a double nave. This plan had the merit, as compared with the plan of a nave and side aisles, of saving one arcade, while it enabled the roof to be constructed in two sections, so as to dispense with the long and heavy timbers required in roofing over a parallelogramic building in one span; it had, however, the disadvantage of necessitating the placing of the chancel to one side of the centre of the church, and of rendering a certain number of sittings in one half of the church unavailable for seeing or hearing. The double-nave plan had also the disadvantage of necessitating a long central gutter between the two roofs. With respect to lessening the cost of churches by cheapening the construction, he had hoped to hear from Mr. White some particulars of his experience in the use of concrete faced with brick for church walls. Was such construction cheaper, not merely in first cost, but in the long run? And did such work stand well? With regard to ornament, it was obvious that in cheap churches there could be very little of it, but at any rate provision might be made for supplying ornament in the way of carving at some future period, for a church was a building in which a certain amount of good ornament might very properly be used. Even in the more costly churches which were erected, a great deal of ornamentation was left to be done after their erection, and in such cases it was found that, from time to time, people came forward with money to defray the cost of such work. Personally, he had a strong predilection for a moderate amount of carving in churches, and he therefore regretted to observe of late an apparent tendency of feeling against the use of carved work. It seemed to him that, while giving due importance to such merits as proportion and beauty of general form, carving was a most legitimate and proper feature of church architecture. In conclusion, Mr. Webb moved a vote of thanks to Mr. White for his paper.

The Rev. R. M. Blakiston, M.A., secretary of the Incorporated Church Building Society, said he had listened to Mr. White's paper with much pleasure, and he was very glad to acknowledge the services which its author had rendered in the matter of providing church accommodation for poor and new neighbourhoods. On the question of materials, it would obviously be the best course in most cases (as Mr. White had pointed out) to use those obtainable in the neighbourhood, not only on the score of economy, but as more likely to harmonise with the natural characteristics of the district. Then, again, the desire for cheapness should never be allowed to interfere with safety of construction. The Incorporated Church Building Society was very efficiently served by a committee of honorary consulting architects, twelve in number, by whom all details of construction proposed in the plans submitted to the Society, with the view to obtain building grants, were rigidly examined; and he was very glad to say that Mr. White had lately joined the ranks of that committee, who were all men of distinction in the profession. He heartily agreed, as a matter of experience, with Mr. White's contention that, when it was required to build a cheap church, the employment of a competent architect was by far the most economical course that could be pursued, and whenever he had heard of local committees proposing to erect churches without employing an architect, but trusting to some local "practical man" to prepare the designs as well as to erect the building, he always sought to dissuade them from that course as one likely to lead them into difficulties and unnecessary expenditure. He was very glad to hear Mr. White deprecate the erection of iron churches. He had no belief in them. They were very uncomfortable buildings, very hot in summer and very cold in winter; and, as had been said, they were expensive to erect, pull down, remove, and re-erect, and, besides, they cost a great deal for repairs. The question of providing mission churches in large parishes at as cheap a rate as was consistent with fitness was one of great importance. The cheapest mission church he ever heard of was one which accommodated 200 persons at a cost of 3*l.* 18*s.*,—not per sitting, but for the whole building! But that was a log erection in Central Africa. The need of mission churches was great, owing to the enormous extent of some parishes. He knew one parish in this country which was nineteen miles long, and which had an area of 60,000 acres. With the parish church at one end of such a parish, it was very evident that without mission churches the people living at the other end of the parish could not be church-goers.

The Ven. the Archdeacon of Grahamstown (who is a brother of Mr. White) expressed the pleasure with which he had heard his brother's paper, and spoke of the difficulties attendant on the erection of churches in the colonies.

Mr. Badnall, barrister-at-law, said that the need of additional churches, owing to growth of population, had been acknowledged so long ago as the time of George III., but many of the churches erected under the Church Building Acts of the latter part of that reign were not only costly, but hideous. He was glad to have lived to see the development of the Gothic revival, one of the first buildings of which, he thought, was Pugin's church at Old Swan, Liverpool. It was gratifying to see that even Methodist chapels were now being erected with some regard to architectural character.

Mr. Hampden W. Pratt said that the thanks of the Association were due to Mr. White for having brought before them so practical a subject in so complete a manner, giving the juniors of the profession the benefit of his great experience. While it was no doubt necessary to have cheap churches, and to ensure their being the best that available means would allow, it was a question whether it would not be, in the long run, the better course (where additional church accommodation was required, but where funds were scanty) to build churches in sections, as circumstances allowed.

The motion, having been put from the chair, was carried by acclamation, and Mr. White briefly replied, without, however, saying anything in answer to Mr. Aston Webb's questions about concrete as a material for church building.

* Printed in the last number of the *Builder*, p. 319.

A NEW PAUPER INFIRMARY FOR MARYLEBONE.

VISIT OF THE ARCHITECTURAL ASSOCIATION.

ON Saturday last a visit was paid by some members of the Architectural Association to an extensive series of buildings now approaching completion in Rackham-street, Ladbroke-grove-road, Notting-hill (or "North Kensington," as it is sometimes called), for the Board of Guardians of the parish of St. Marylebone. These buildings have been specially designed by the architects, Messrs. H. Saxon Snell & Son, as an infirmary for the sick and infirm poor of that parish, and have been erected by Messrs. Wall, Bros., of Kentish-town, the contract amounting to 109,000*l.* The site acquired is three acres and a half in extent. The buildings consist of an administrative block in the centre, flanked on either side by two double ward blocks parallel to each other and to the central block, so that, including the central or administrative block, the main buildings consist of five blocks parallel to each other. The buildings are planned on what is now well known as the pavilion principle, so that each block of buildings is, as far as is compatible with facility of communication and administration, isolated from other portions of the building. The entrance is in Rackham-street, on the south side of the site, through a spacious gateway, over which is the chapel, 60 *ft.* long by 30 *ft.* wide, with boarded wagon-roof of trefoil section, 22 *ft.* high to the wall-plate, and about 45 *ft.* to apex. Sittings are provided for 250 persons. The interior walls and tracery of the windows are very nicely executed in white Suffolk bricks. The chapel is warmed by means of one of Mr. Saxon Snell's patent "Thermhydric" stoves, which are also used in the wards, as hereafter mentioned. Flanking the entrance gateway and chapel are residences for the medical officers. The site, it should be mentioned, has a considerable fall from east to west, so that in those portions of the buildings which occupy the western half of the site an extra story is obtained. The ground-floor of the main buildings is, therefore, while veritably the ground-floor at the east end, the first floor at the west end. The administrative block and the ward blocks have their longer axes running northwards, and are connected together by a transverse cor-

ridor 450 ft. long running from east to west. This corridor is glazed where it passes through the open spaces between the blocks, and is surmounted by a flat available as a promenade for convalescent patients in fine weather. All the ward blocks are two stories in height above the ground-floor, and inasmuch as there are two large wards on each floor, it follows that there are six wards in each ward-block, or twenty-four wards in all, exclusive of the smaller separation wards, one of which is attached to each general ward. The two large wards are placed end to end, with, however, some intervening apartments, including the separation wards, a day-room for convalescents, nurses' sculleries, and the staircase, together with, on the ground-floor, the transverse corridor which runs through the centre of the ward-blocks on that floor, having one general ward and its concomitant apartments to the north of it, and another ward and its belongings to the south. Each of the large or general wards is 84 ft. long by 24 ft. wide, and 13 ft. high in the clear, and there will be 28 beds in each ward. The walls are faced with Keene's cement, and the warming will be effected by two of Mr. Saxon Snell's thermhydric stoves placed in each ward. In connexion with these stoves there will be inlets for fresh air, which will be warmed as it enters, and air will also be admitted directly through the walls, into skirting-boxes placed between the beds. Provision is made for carrying off the foul air of the wards and the products of gas combustion through upright flues in the external walls. The water-closets, bath, and slop-sink attached to each ward are at the end of the ward most remote from the centre of the ward-blocks, and are all trapped and disconnected, the soil-pipes being thoroughly ventilated from end to end. The same remark applies to the water-closets, &c., in the administrative portions of the building. The wards on one side of the administrative block will be for men, and those on the other side for women. The administrative block contains, besides the large kitchen (fitted with Benham & Son's cooking apparatus on a gigantic scale), other domestic offices and stores, and may be said to partake in some respects of the nature of a tolerably good-sized hotel, for in it fifty-eight nurses, all trained in Miss Nightingale's institution, will be lodged; and each nurse has a room all to herself. In the upper part of this block are the laundries and drying-room, an extensive covered loggia, open to the air, forming part of the arrangements for drying. The laundries have been fitted by Messrs. Bradford & Co. with powerful machinery, to be worked by steam. The central feature of the administrative block is the massive tower, 182 ft. high, which forms a landmark as seen from some of the "northern heights of London," and in the interior of which the chimney-shaft from the boiler-furnaces below is carried up. The upper part of the tower also contains a number of large tanks, affording storage for 25,000 gallons of water. Touching water supply, it may be mentioned that a well, 500 ft. deep, has been sunk by Tilley, of Walbrook, and powerful pumps are provided, the yield of water being 6,000 gallons per hour. We understand that by thus obtaining the water required at this large institution the Guardians of St. Marylebone will save the ratepayers at least 250*l.* per annum. It should be stated that the boilers, engines, pumps, tanks, and the cold-water service generally, have been executed by Potter, of South Molton-street. Among other accessory items of accommodation comprised in the plan are a mortuary capable of receiving sixteen bodies, and a *post-mortem* room adjoining. The work throughout appears to be thoroughly sound and good. Mr. J. W. Dorrell is the clerk of works, and Mr. Kitchener is the contractors' foreman. The work was commenced in May, 1879, and it is expected that the buildings will be completed and opened two months hence, so that their erection will have extended over a period of just two years. The visitors on Saturday last were very kindly received by Mr. H. Saxon Snell, jun., who conducted them over the buildings and gave them a great deal of information,—a work in which he was zealously seconded by Mr. Dorrell.

Melbourne Exhibition. — Messrs. W. Smeaton & Sons, of the Eddystone Sanitary Engineering Works, and Messrs. William Walker & Sons, cabinet manufacturers, Bunhill-row, have gained awards of the first class.

LIVERPOOL ARCHITECTURAL SOCIETY.

THE sixth ordinary meeting of this Society was held on the evening of the 9th inst., at the Royal Institution, Colquitt-street, the President, Mr. Charles Aldridge, F.R.I.B.A., in the chair. The drawings submitted by the Class of Design and Construction for a "Public Refuge, Lamps, and Drinking-fountains to be erected on the open space above the George's Landing-stage" were exhibited on the walls.

The paper for the evening, entitled "Impressions and Recollections of North Wales," by Mr. Samuel Huggins, was read by Mr. J. M. Hay, in the unavoidable absence of the author. We will print it in our next. A discussion followed, in which several gentlemen took part, and the meeting terminated with the usual vote of thanks to the author of the paper and to Mr. Hay.

COST OF STRIKES.

THE statistics collected by Mr. Chappell, a large colliery proprietor, with reference to the strikes of the last twelve years, and brought forward in a speech at Swinton, near Rotherham, should be read, marked, learned, and inwardly digested by every working man, and by every one interested in the industry and welfare of England. We throw the facts into a tabular form, in order both to save room, and to give them the emphasis of their own silent logic. The first column gives the locality of the strike cited, the second column gives the money diverted from the sick fund, or what ought to be exclusively the sick and accident fund, for the support of the strike. The third column shows the wages lost by idleness:—

Locality.	Strike Pay.	Loss of Wages.
Monk Bretton	£8,000	£45,000
Dodworth Silkstone	2,500	52,000
Manver's Main	18,000	41,000
Swaithe & Edward's Main	2,500	20,000
Darfield	—	—
Wombwell, Low Hill, Kiveton Park, Shireoaks, Aldwark Main, Mitchell's Main, Wharncliffe, and Silkstone	7,000	100,000
General Strikes	52,000	450,000
Present Strike	—	40,000

The above figures do not exactly fit with Mr. Chappell's totals of not less than 77,000*l.* paid to the men on strike, and of 788,000*l.* lost in wages, but we give the figures as reported. It is earnestly to be wished that a definite report, stating the duration, as well as the cost, of each strike, the number of men out, the selling price of coal, the proportion of the loss to the country (at that price), the loss to the miners, and the misdirection of the money of the associations, should be published on avowed authority.

The net results of this cost of 865,000*l.* are stated to have been two victories for the strikers. One was at Denaby, in 1879-80, for unionism,—a costly victory for the men. The other was at Manver's Main, where they were out for sixteen weeks, and obtained a rise of wages. The terms were high, and had to come down again. We hope Mr. Chappell will put the statement into that complete form which will make it irresistibly telling. He is the real friend to the working man who shows him the truth.

THE PUBLIC LIBRARY AND HASTINGS MUSEUM, WORCESTER.

THIS institution was formally opened on Wednesday last, the 16th inst., by his Excellency the American Ambassador, the Hon. J. Russell Lowell, who, it may be stated, is descended from a Worcester family. The Public Libraries Act was adopted in Worcester in April, 1879, and the building was purchased from the Museum Building Society, by means of the public subscription which was raised to provide a Library Building, fittings and books, and which, it is hoped, will ultimately reach the sum of 5,000*l.* The building, from its peculiar character, and the special objects for which it was built, offered many difficulties to a complete adaptation for all the purposes of a Public Library. The architect of the Public Library and Museum at Derby (Mr. R. Knill Freeman, of Bolton), was selected by the committee to design and superintend the necessary alterations, and satisfaction is expressed at the manner in which he has accomplished his task. On the left of the vestibule will be found the Lending Department, where borrowers will apply for their books. A counter runs nearly the full length of this space, and on portions of this counter Cotgreave's Indicator will stand, on reference to which borrowers will be able, at a glance, to see whether the books they want are in the Library without troubling the Library staff at all. The Librarian's room overlooks this department. Catalogues will be placed here for reference, and also a locked box to receive any complaints or suggestions from borrowers. Behind the counter in the Lending Department stand shelves devoted to some of the more popular classes of books. The Lending Library Book Store opens out of the Lending Department. It has been reclaimed from the east end of the lecture-room (now the news-room), and the floor of the store and the gallery above have been so utilised that the book space is sufficient to provide for accessions of books for some years. The News-room is approached from the vestibule, and has been decorated by Messrs. Wells & Son (the contractors), and the fittings and appointments will be in keeping with the decorations. The newspaper stands are ranged round the room between the pilasters. The names of the newspapers will be fixed on the stands, as is done at the Birmingham Free Library; so that a reader may see on entering the room the position of the paper he wishes to consult. Three large reading-tables will be placed in the centre of the room, and one in the recess at the west end. A large plaster figure of "Rhetoric" will occupy a portion of this recess, and a bust of the late Alderman Edward Webb will also find an appropriate place in this room. The Reference Library and Reading-room have been formed by practically throwing the Council-room and the Curator's room into one. The fittings and appointments are in oak. A large reading-table will stand in the centre of the room, while another runs along the west wall of the apartment. Three oak bookcases are placed in the Reading-room, and the remaining shelf-room is found in the book-store beyond. The ventilation of the Reading-room has received careful attention. All the floors are laid with linoleum, on paper.

THE PROPOSED EXPENDITURE ON NEW RAILWAY, TRAMWAY, AND GAS AND WATER PROJECTS.

THE report of the Board of Trade, which has just been issued, on the several railway, tramway, and gas and water Bills which are to be investigated by Parliamentary committees during the present session, contains some interesting statistics as to the proposed expenditure to be incurred in carrying out the various works for which Parliamentary sanction is sought. The total number of these Bills is 183, and the aggregate amount of money proposed to be expended in executing the works to which they refer is no less than 41,946,466*l.*

Upwards of four-fifths of this large sum is proposed to be expended in the construction of new railways and additional railway works. Of the entire number of railway Bills, eighty-five are promoted by existing companies for the construction of 381 miles of additional lines, at an outlay of 21,700,496*l.*; and thirty-four of the Bills are promoted by new companies for the construction of 433 miles of railway, at an outlay of 11,941,396*l.*; the aggregate length of proposed additional lines by existing and new companies being 814 miles, and the expenditure 33,641,892*l.* It is a noteworthy feature that the Bills by existing railway companies show a very considerable increase when compared with those of last session, not only in their number, but in the length of new railway, and in the amount of additional capital proposed; the number of these Bills being eighty-five, as above stated, against fifty-nine last session; the length of railway, 381 miles against 181 miles; and the capital, 21,700,496*l.* against 6,460,792*l.*, for the Bills promoted in 1880. As regards the London, Chatham, and Dover Company, it may be incidentally stated that they have three Bills, by one of which,—their City and Suburban Traffic Station Bill,—they propose to construct a line from the south end of their Blackfriars station, which will pass over the Thames by an additional bridge, or by a widening of the existing bridge, to the south side of Upper Thames-street. The most important of the Bills by new companies are the Guildford, Kingston, and London Bill, for the construction of lines from the South-Eastern and London and South-Western Railways at Guildford, to the Metropolitan District Railway at Fulham, the proposed expenditure being

1,730,000*l.*; and the Birmingham, Walsall, Cannock Chase, and North-Staffordshire Junction Bill, for the construction of new railways, thirty-one miles in length, which will extend from the Great Western Railway at Birmingham to the North-Staffordshire Railway at Colwich, the proposed expenditure being 1,333,000*l.*

The number of bills relating to tramways is twenty, for the construction of 55 miles, at a cost of 935,750*l.* The gas bills are twenty-four in number, and the proposed expenditure for works in connexion with them is 2,422,574*l.*; and the water bills, twenty in number, with a proposed expenditure on works, for which power is sought, 4,946,250*l.* With regard to these several bills, however, it must be added that, in addition, there are thirty-eight applications to the Board of Trade for provisional orders to construct tramways, 224 miles in length, at an estimated cost of 1,003,227*l.*; and nineteen similar applications, in respect of gas and water projects, the total sums proposed to be raised under such Board of Trade applications being 1,939,500*l.*

The report adds, with respect to tramways, that the total length of tramways which has already been authorised by Parliament amounts to 642 miles, and that, of the total length opened, 50 miles are laid in the metropolis.

OBITUARY.

Mr. Thomas Brigstock, a name scarcely known to the present generation of painters, died suddenly of disease of the heart on Friday, the 11th inst., aged 72. He was successively the pupil of the Royal Academicians Briggs and Knight. He had of late years devoted himself more exclusively to literature; his published works have been anonymous. He was engaged just before his death in preparing for the press a series of original fables to be published by Messrs. Chatto & Windus. The following notes on his career as a painter may be gathered from Ottley's Supplement to Bryan. His elementary studies were pursued under the direction of Mr. H. Sass; he gained the large silver medal of the Society of Arts for a drawing of the head of the Laocoon, and another silver medal for an oil-painting of "Still Life." Eight months after, he was admitted as a student to the Schools of the Royal Academy, and subsequently became the pupil of the two Royal Academicians already mentioned. He studied also at Paris, Florence, Rome, and Naples during a space of eight years. A copy which he made in this period of Raffaelle's Transfiguration was purchased as an altar-piece for Christ Church, Albany-street. He exhibited his first picture of "Alnaschar," from the Arabian Nights, at the Royal Academy, about the year 1842. He went to Egypt in 1847, being the bearer of an address from the Oriental Club to his Highness Mohammed Ali Pasha, of whom he painted several portraits. His most important portraits were those already referred to of the pasha, one for the palace of the citadel at Cairo, another for the palace of the Ras et Tin, Alexandria, and a third for the Oriental Club; three of General Nott, one for Calcutta, a second for the Town-hall, Carmarthen, and the third for the Oriental Club. He painted the portraits of General Sir James Outram for the Oriental Club; of Cardinal Wiseman for St. Cuthbert's College; and of Sir Henry Holland for Mr. Hudson Gurney. He also painted an historical picture of the "Prayer for Victory," purchased by the late Mr. J. Lloyd Davies, M.P. All these paintings were exhibited at the Royal Academy.

Water-softening Company.—The prospectus of a new company which has been formed to take up the question of improving our water supply throughout the country, has lately appeared in our advertising columns. The name of the company is "Atkins's Water Softening, Purifying, and Engineering Company (Limited)." Capital, 100,000*l.*, in shares of 1*l.* each. The intended operations of the company include the following points:—The introduction of improved means of purifying and softening water in large quantities, for water-works, manufactories, laundries, breweries, asylums, and other large establishments, and particularly for railway companies, and other cases where steam-power is used. The system to be introduced by the company prevents incrustration, and consequently the various railway companies are said to be already negotiating for the introduction of the system on their respective lines.

PATENT RECORD.*

APPLICATIONS FOR LETTERS PATENT.

822. B. C. Cross, Dewsbury. Socket-pipes for sewers and drains. Feb. 26, 1881.

823. B. C. Cross, Dewsbury. Construction and glazing of windows. Feb. 26, 1881.

840. B. G. D. Cooke, Colomendy. Construction of cupolas, furnaces, fireplaces, stoves, &c. Feb. 28, 1881.

846. W. H. Crispin, Stratford. Lock and door catches. Feb. 28, 1881.

849. J. H. Johnson, Lincoln's-inn-fields. Bituminous cements. (com. by E. J. de Smedt, Washington, and E. J. Twining, United States Army). Feb. 28, 1881.

851. E. A. Brydges, Berlin and Upton. Paving (com. by Count L. von Hegnenberg, Bavaria). Feb. 28, 1881.

861. W. Morgan-Brown, Southampton-buildings. Hanging doors and blinds (com. by E. Prescott, Rockingham, U.S.A.) March 1, 1881.

869. D. Edwards, Cardiff. Lifts or hoists. March 1, 1881.

875. H. Faija, Westminster. Treatment of concrete and cement. March 1, 1881.

899. W. Wright, Plymouth. Valves for water. March 2, 1881.

906. G. L. Shorland, Manchester. Stoves and fireplaces. March 3, 1881.

912. R. Adams, Southwark. Conversion of vertically sliding sashes into revolving sashes, &c. March 3, 1881.

NOTICES TO PROCEED

have been given by the following applicants on the dates named:—

March 1, 1881.

4,370. J. W. Holland, Liverpool-road. Water-closets, &c. Oct. 26, 1880.

4,544. H. H. Lake, Southampton-buildings. Smoke-consuming fireplaces (com. by La Société Nessi, Frères, Paris). Nov. 5, 1880.

653. W. A. G. Schönbeyder, Stoke Newington. Stoves for heating, lighting, and ventilating. Feb. 15, 1881.

March 4, 1881.

4,883. H. C. Roberts, St. James's-square. Keyholes. Nov. 24, 1880.

568. A Murfet, Nottingham. Firebars. Feb. 10, 1881.

ABRIDGMENTS OF SPECIFICATIONS

Published during the Week ending March 5, 1881.

2,982. P. Keppie, Edinburgh. Water-closets, &c.

The closet basin is made of delf, and directly attached to the trap bend of the soil-pipe, without an intervening trunk, and this bend is also made of delf, and fitted to rest on a bracket. The seat of the closet is held up by a spring a short distance above the front panel, and the depressing of the seat opens a valve, and allows water from the cistern to enter a small chamber, which is made to hold sufficient for a single flush. When the seat is again allowed to raise itself, the water from the small chamber flushes the closet basin. (*Pro. Pro.*) July 20, 1880. Price 2d.

3,019. P. L. Varley, Staithwaite. Apparatus for sawing stone.

Constructs sawing-blades so that their cutting parts are renewed by the wearing away of the blades. The sawing edges have semicircular or V portions cut out at intervals. In the body of the blade are similarly-shaped perforations cut in alternately, so that as the first set of teeth are worn away, the second set come into use, and so on. (*Pro. Pro.*) July 22, 1880. Price 2d.

3,003. E. J. Schackleton and G. J. Kemp, Dartford. Manufacture of bricks, tiles, &c.

The clay, earth, and other material containing stones, flint, &c., are conveyed to a mortar-mill, the heavy edge rollers of which crush the materials, and allow them to pass through a grating to a pug-mill, where they are treated in the usual manner. July 20, 1880. Price 4d.

2,850. J. Dewrance, Great Dover-street. Glazing for roofs.

The sash-bars, which may serve as rafters, follow the inclination of the roof. A central ridge is formed on the top of each sash-bar, with a gutter on either side. The panes of glass rest on the sash-bars between the ridges, overlapping each other in the usual manner. Strips of lead are attached to the ridges, also overlapping each other, and are bent down to the surface of the glass, holding the panes tight. There is a strip of lead to each pane of glass, and the upper end is folded down to prevent the upper pane slipping from its place. July 10, 1880. Price 6d.

2,853. W. R. Maguire, Dublin. Automatic flushing apparatus for cleansing drains, &c.

The tank is fitted with a valve over the discharge-pipe, and an overflow-pipe is arranged to discharge the water into a small closed vessel, which is suspended either outside or inside the tank. This vessel is connected with the valve. When the tank is filled, the overflow water runs into the small vessel, which by its weight descends and opens the valve, allowing all the water in the tank to run out. A small pipe or hole is fitted to the suspended vessel, which gradually empties it again, when it rises and shuts the valve, thereby allowing the tank again to fill. July 10, 1880. Price 6d.

2,954. A. Cole, Norwood. Preventing waste of water in closets, &c.

Applies to the ordinary cistern a syphon, one leg of which works by a sliding joint over the discharge standpipe, and the other leg is immersed in the water. The syphon is attached to a lever with a counterbalance weight, which normally keeps the bend of the syphon above the level of the water. When water is required, the lever is pulled over so as to bring the bend of the syphon below the level of the water. The water then immediately flows through the syphon down the discharge-pipe. July 17, 1880. Price 4d.

3,073. H. Westman, Birmingham. Ornamentation of mouldings.

Prints ornamental designs on mouldings by printing blocks curved accordingly, and made of a yielding substance such as india-rubber, &c. (*Pro. Pro.*) July 26, 1880. Price 2d.

3,100. P. Wood, Okehampton. Tools for dressing stones.

A thin flat cutting chisel firmly fixed in a socket by set screws, and a wedge driven through one of a number of slots provided in the head. (*Pro. Pro.*) July 28th, 1880. Price 2d.

3,108. T. H. Austin, Kensington. Fastening devices for window-sashes, &c.

Uses two pieces of metal so curved that together they form a circle. On the lower sash is placed one of these, which is about two thirds of a circle. On the upper sash is placed the remaining one-third. A central hole is formed in the body of these two pieces, and extends completely round them. A curved bolt is fitted within this hole in the larger segment. To lock the sashes, a portion of this bolt is pushed into the hole in the smaller segment, and a flat spring catches a notch formed in the bolt, which is thereby locked. This fastener may also be used for doors. (*Pro. Pro.*) July 28, 1880. Price 2d.

3,216. W. Batten, Aston, near Birmingham. Moulds for the manufacture of paving and other bricks from slag or scoria.

These moulds have closed tops or covers, in the middle of which is a rectangular opening, and to one end of which is fitted a lever. The lever has a plunger, which fits the rectangular opening and projects a short distance into the mould. In the sides of the mould are a series of small holes. The molten slag or scoria being poured into the mould, the plunger is pressed by the lever into it, and forces the slag into all parts of the mould, any surplus material passing through the small holes. After solidification, the plunger is raised, and the bricks or slabs are removed, which are by this method made more uniformly. August 6, 1880. Price 6d.

* Compiled by Hart & Co., Patent Agents, 28, New Bridge-street, E.C.

THE SOUTHWARK AND VAUXHALL WATER COMPANY AND THE BERMONDSEY PUBLIC BATHS.

THE Commissioners have had to ask the Vestry to direct the overseers to pay them the sum of 2,250*l.* in order to meet their liabilities. The Commissioners state that this deficit has been caused by the sinking of an artesian well, which was necessitated by the arbitrary action of the Southwark and Vauxhall Company, who had raised the price of water from 150*l.* per annum to 3d. per 1,000 gallons, and then to 6d., which amounted to 500*l.* per annum. The Commissioners add that the entire cost of the well was 3,000*l.*, but that 750*l.* of the amount had been paid out of the profits of the baths. The request of the Commissioners has been complied with, the overseers having been directed to pay over to them the sum asked for. The action of the Water Company has, in the result, deprived them of a considerable source of income, whilst the annual expenditure of the baths establishment has been relieved in a corresponding degree.

THE PROPOSED NEW WORKHOUSE IN DULWICH.

THE intention of the St. Saviour's Board of Guardians to erect a new workhouse at Champion Hill, Dulwich, is causing much excitement and opposition amongst the residents in that locality. The land upon which the intended workhouse is to be erected has an area of six acres and a half, for which the guardians have agreed to pay 14,000*l.*, being at the rate of upwards of 2,000*l.* an acre, whilst the estimated cost of the building itself is 50,000*l.* Meetings of the inhabitants of the neighbourhood have been held to protest against the undertaking, and the question was also discussed at a meeting of the Camberwell Vestry held last week. The feeling of the vestry was almost unanimous against the proposal, and a resolution to that effect was adopted, but there can be little or no doubt that the erection of the building will be proceeded with, the Local Government Board having sanctioned the purchase of the site.

BOILER EXPLOSIONS.

SIR,—I should be glad to know (not relishing the ambiguity of your correspondent, Mr. James France Hill) any other method of making an automatic hot-water apparatus than that suggested by your correspondent, Mr. Smeaton, for the cylinder or "Yankee" system, viz., a hot-water store cistern fixed in the most convenient place away from the action of frost. I cannot suppose that Mr. Hill, whose communication I read in your last issue, is under the impression that only *one* firm knows the secret of making a perfectly self-acting apparatus of this kind, which may be seen in a dozen or more catalogues of London firms. I have watched this work most closely, and would suggest that your correspondent should point out the improvement which he is aware of to make a more automatic system than the following, which, I take it from his letter, is as recommended by Mr. Smeaton:—

1. A boiler, with flow and return-pipe between it and the cylinder, preferably fixed in the kitchen.

2. To the cylinder fixed an expansion-pipe, carried above the cold-water cistern, open at the end.

3. The cold supply carried direct from the cold-water store-cistern into the boiler or cylinder, no branches of any kind being taken from this pipe for other purposes.

4. All draw-offs for hot water to be taken from the expansion-pipe, thus drawing the hottest water in the system without any admixture of cold.

5. A thorough protection of the flow, return, supply, and expansion pipes by a covering of asbestos, cork, or hair-felt, or any other good non-conductor.

6. A good safety-valve, which it is the merest nonsense to describe as a broken reed.

7. It is a perfectly easy matter to obtain a complete circulation in the expansion-pipe by means of a smaller pipe being carried back again into the return-pipe of the cylinder, and the same thing applies to all the branches. This was also pointed out by Mr. Smeaton, if I remember rightly, in some former correspondence. As Mr. Hill has thought proper to let all the world know, through the medium of your valuable columns, that he is in possession of the knowledge whereby "the most safe and reliable system known" may be constructed, I think that we may fairly ask him, in the interests of the public generally, to enlighten our darkness on this most important point.

F. CRESWELL HEWETT, M.D., D.Sc.,
Late Royal Victoria Hospital, Netley, and Military Hospital, Halifax, N.S.

WHY IS NOT LITTLE QUEEN-STREET WIDENED?

SIR,—We will begin by mentioning that we have not the smallest pecuniary interest in this improvement. Our object in addressing you being to obtain more *light* on a subject of vital public importance, considering the accidents which are daily occurring.

A largely-signed memorial was presented to the Metropolitan Board of Works on the 25th ult., by a deputation of adjoining owners and occupiers, and Mr. Newton Wilson, speaking on their behalf, said that "the prayer of the memorial was not a new one, the improvement having been asked for some time ago. There was, however, a daily increasing necessity for carrying out the improvement, inasmuch as scarcely a day passed without the occurrence of some accident owing to the narrowness of the street. He would only refer to two accidents that had occurred during the last few weeks,—Vice-Chancellor Bacon having been a victim on the 11th inst., and Mr. Justice Grove only a fortnight before. These were only well-known instances of accidents that were constantly occurring. Last week three accidents had occurred. The policemen whose duty it was to prevent, if possible, any blocks in the traffic found it impossible to do so. The improvement prayed for was not merely a local, but a metropolitan one, inasmuch as this narrow street was an important connecting link not only between the East of London and the extreme West, but also between North and South. The particular part of the street which required to be improved was only 145 feet in length, and was located at the northern extremity. It was occupied by property of a very secondary character, and was, in fact, in such a state that it had been CONDEMNED. He wished particularly to call the attention of the Board to this fact, as the present time presented a very favourable opportunity for making the improvement desired at a minimum of cost, and if there was any delay in the matter, the cost would be very much more. In conclusion, Mr. Wilson said the question was not unworthy of the notice of a Board which had already earned the gratitude of the metropolis by the many vast public improvements which it had carried out.

The Metropolitan Board of Works say they have no power to take the work into their own hands, but have offered to contribute one-half the net cost of improvement if effected by the local board of St. Giles's, and they will lend 10,000*l.* more at four per cent., repayable in fifteen years.

Nearly the same deputation waited on the local board on the 8th inst., and strongly urged them to accept the terms offered by the Metropolitan Board, and the subject will be considered at the Board meeting on Tuesday next.

"Why, of course, they will gladly accept these terms," your uninitiated readers will exclaim.

We venture, however, to prophesy that unless much public pressure be brought to bear, the offer will be hushed up and rejected, on the plea of saving expense to the ratepayers.

"Why?" the said readers will ask.

If some independent member of the local board will give us truthful answers to the following questions, the public will perhaps be in a position to judge for themselves.

1. Are any members of the local board in favour of an alternative scheme for forming a new street from the corner of Great and Little Queen streets into Holborn (by the Royal Music Hall)?

2. Would not this scheme involve the demolition of several almost new warehouses and other very valuable property?

3. Are any members of the local board owners or leaseholders of any property so affected; and, if so, to what extent?

4. The estimated cost of widening the old street, and also for forming a new one?

5. The arguments (if any) which can be advanced in support of the great expense of a new street, in lieu of widening the old one at a comparatively small cost?

ARCHITECTS AND SURVEYORS.

CHIMNEY-DRAUGHT AND REDUCTION OF PRESSURE.

SIR,—I am rather surprised at Mr. Edwards stating, on page 325, that "none care to incur the expense of buying an anemometer nor taking the trouble to experiment with it in the case of household chimneys." I should have imagined that, as Mr. Edwards has written and published a good deal about ventilation, he would have both bought and used an anemometer in order to assist him in getting reliable results. I had to do so myself, and at page 451 of the "Transactions of the Philosophical Society of Glasgow, A.D. 1879," an account is given of some experiments I made in company with Dr. Wallace, the present president, with the chimney of my dining-room. We then found that, with the door shut, the air passed into the fire-place through a 10-in. diameter tube at the rate of 430 lineal feet per minute; door open, 470 ft.; but with the window 6 in. up, 600 ft., or 36,000 ft. per hour. The fire in this case was not large.

As to Mr. Edwards's idea that the draught of the chimney causes "a reduction of pressure in an apartment," which reduction produces "closeness," I fear Mr. Edwards is rather "at sea" with his ideas of the cause of the "draught" or up-current in the chimney. He seems to imagine that the chimney *pulls* the air out of the apartment, whereas it is the air outside of the apartment that *pushes* the air in the apartment up the chimney. The weight of the column of heated air inside of the chimney being less than the weight of the column of air of equal height outside of it, the consequence is that the difference of pressure at the foot of the chimney causes the heated lighter air to ascend, and the stronger the fire the hotter and lighter the air in the chimney, and so the greater the speed of the up-current.

Having thought over this explanation, Mr. Edwards must try to get some other cause for the "closeness" he mentions.

W. P. BUCHAN.

AUCTIONEERS' COMMISSIONS.

GLASIER AND SON *v.* J. O. HALLIWELL-PHILLIPPS.

THIS case was tried at Westminster before Mr. Justice Field and a special jury, on the 7th and 8th inst. The action was brought by the Messrs. Glasier, auctioneers, of Charing-cross, against Mr. Halliwell-Phillipps, to recover 1,300*l.*, as commission, &c., on the sale of the Middle-hill Estates, on the borders of Gloucestershire and Worcestershire, for a sum of 113,000*l.*

Mr. Hardinge Giffard, Q.C., and Mr. Bigham appeared for the plaintiffs; and Mr. Webster, Q.C., and Mr. Barnes represented the defendant.

Justice Field, on the court resuming on the 8th, said he considered the plaintiffs, who had closed their case on the previous day, had made out no case to go to the jury, and he would therefore nonsuit the plaintiffs.

Nonsuit ordered accordingly.

The facts seem to be these. The plaintiffs agreed to undertake the sale of the property by auction for the sum of 1*l.* per cent. upon the amount realised, and in case the property should not be sold to accept the sum of 50 guineas, and the expenses incurred. They had said in their first letter to the defendant on the subject that they would have no charge against him unless they introduced a purchaser. At the sale, July 19, 1878, the properties were bought in at prices fixed, there being no bidder up to the amounts required. In the following month, August 9th, the defendant sold one part of the property for 38,000*l.* and in October the other portion for 75,000*l.*, neither of the buyers having been introduced by the plaintiffs, who had, however, been in treaty unsuccessfully with various other parties. The contention of the plaintiffs was that it was a custom of trade that the commission should be paid on the amounts realised for property sold within a reasonable time after an auction. The Judge did not think it necessary to call on the defendant's counsel to reply.

The Proposed Townhall for Ramsgate will be erected from plans by Mr. Barley, the town surveyor, who estimates the cost at 18,000*l.*

Books.

Quantity Surveying. For the use of Surveyors, Architects, Engineers, and Builders. By J. LEANING. London: Spon, 16, Charing-cross. 1880.

THE object of the author of this manual is to bring about the adoption of a methodical and uniform mode of procedure in taking off quantities and preparing estimates. It contains a large amount of information, and numerous hints and suggestions which will be found valuable by the student. It is not to be supposed that it will of itself make quantity-surveyors. There is no royal road to the possession of the knowledge required for the satisfactory practice of that responsible and arduous profession; but it makes readily accessible much information which would otherwise have to be picked up piecemeal. Mr. Leaning appears to have been brought up in a good school, and expresses a wish, in a letter accompanying the volume, that it should be known that he gained much of his knowledge in the office of Mr. Rickman. We are quite disposed to think him correct in supposing that his sections on the Order of Taking Off on various principles, Office Practice, the Settlement of Variations, the Treatment of Works of Alteration and Restoration, the Law, the forms of Bills and Schedules of Prices, and the examples of Collections and Taking-Off, will be found useful.

Miscellanea.

Society of Engineers.—At a meeting of the Society of Engineers, held on Monday evening, March 7th, in the Society's Hall, Victoria-street, Westminster, Mr. Charles Horsley, president, in the chair, a paper was read by Mr. Charles Gandon on "Gas Engines." The author gave a brief description of the introduction of gas-engines, and stated that coal gas was first practically applied for working engines in the "Lenoir" and "Hugon" engines, the first of which was patented in 1860, and introduced into this country at the Exhibition of 1862. The general details of this engine were described, and several defects pointed out, such as the necessity for the employment of electricity for igniting the charges of gas and air, and the sudden and violent shocks caused by the explosions. The "Otto & Langen" gas-engine was then described, which dispensed with the use of electricity, and avoided the sudden shocks by utilising the explosions to compress air, which afterwards imparted motion to the engine. It was pointed out that the chief improvement made in the construction and working of gas-engines was due to the compression, before ignition, of the charges of gas and air, by which a larger proportion of air could be used than would form an explosive mixture under ordinary atmospheric pressure, the force thus obtained being gradual and continuous instead of sudden, and resulting in an economy in the gas consumption, and more regular working. Several gas-engines constructed on this principle were described; the most prominent of which was the "Otto Silent Gas Engine," which for economy and regular working seems to have the preference, the consumption of gas being given at 21 cubic feet per horse power per hour, as compared with 40 to 70 cubic feet with former engines.

Bad Building at Southgate.—At the Highgate Police-court, on Monday last, Mr. H. Wyatt, builder, of Shaftesbury-road, Hornsey-road, appeared to an adjourned summons, taken out by the Friern Barnet Sanitary Board, for erecting two houses on the Holly-park Estate, New Southgate, without having used proper mortar or cement in the construction of the party and external walls. The evidence of three surveyors, in support of the summons, was to the effect that the compound the defendant was using for building the back additions to the two houses was not mortar at all, but a mixture of top mould and old plaster (spent lime). For the defence several witnesses were examined, who said the mortar in use was good, but they admitted that the sample before the court was not of the best quality. On the defendant promising to pull down and rebuild with proper mortar the back additions of the two houses, Mr. Bodkin, the magistrate, said he thought the justice of the case would be met by a fine of 40*s.* and 2*l.* 3*s.* costs.

School Board Schools.—At the last meeting of the School Board for London, the Works Committee reported that they had "obtained tenders for the erection of a school to provide accommodation for 600 children on the site in Merton-road, Tooting (Lambeth CC). They recommend that, so soon as the plans shall have been approved by the Education Department, the tender of Messrs. Stimpson & Co., 78, Brompton-road, amounting to 6,682*l.*, be accepted. The cost of this school will exceed 10*l.* per head, owing to the fact that, although provision will only be made at present for 600 children, the building has been planned with power of extension; and cloakrooms will be provided for a school for 1,000 children in order to save future expense. When the school is enlarged the cost per head will be considerably reduced. The total cost per head, including the cost of teachers' rooms, schoolkeeper's residence, &c., is 11*l.* 2*s.* 8*d.* The cost of the site is 3,834*l.* 17*s.* 4*d.* The committee have also obtained tenders for the enlargement of the Monnow-road school, Bermondsey (Southwark AA), by 400 places, and for carrying out various additions to the existing school. They recommend that, so soon as the plans shall have been approved by the Education Department, the lowest tender, that of Messrs. Kirk & Randall, of Warren-lane Wharf, Woolwich, amounting to 5,584*l.* be accepted. The total cost per head of the enlargement, including all alterations rendered necessary, is 13*l.* 19*s.* 2*d.* The total cost per head of the whole school is 10*l.* 12*s.* 10*d.* The committee have also obtained tenders for the enlargement of East-street, Lambeth, school (Sub-division F) by 400 places, and for providing additional cloak accommodation for the three departments of the existing school. They recommend that, so soon as the plans shall have been approved by the Education Department, the tender of Messrs. Atherton & Latta, of 71, Chrisp-street, Poplar, amounting to 3,630*l.*, be accepted. The total cost per head of enlargement is 9*l.* 1*s.* 6*d.* On the 21st of April last, the Board accepted the tender of Messrs. Wall Brothers, of 2A, Dale-road, Kentish-town, amounting to 5,436*l.*, for the erection of the Brecknock School, for 600 children, on the site in York-road, Camden-town (Marylebone Q). The Education Department have since sanctioned the provision of an additional 400 places on this site; and, as the contractors are still on the ground, the committee have obtained a tender from them for carrying out the enlargement on the contract schedule of prices. The committee recommend that, so soon as the plans shall have been approved by the Education Department, this tender, which amounts to 2,484*l.*, be accepted. The cost per head of enlargement is 6*l.* 4*s.* 2*d.*" The report was adopted.

Rateability of the New River Company's Property.—At the Court of General Assessment Sessions, Westminster, on the 9th inst., the New River Company were appellants in three cases. In the appeal against the parish of St. Andrew, Holborn, they stated that, as occupiers of land and mains within the respondents' parish, they were assessed at 4,260*l.* gross and 3,866*l.* rateable value, but they claimed to have these amounts reduced to 2,974*l.* gross and 2,704*l.* rateable. The Court reduced the gross assessment to 3,975*l.*, and the rateable to 3,318*l.*, each to pay their own costs. In the appeal against the parish of St. Luke, Middlesex, it appeared that the appellants were assessed by the respondents of this parish at 8,286*l.* gross and 7,520*l.* rateable. This assessment was subsequently reduced to 5,332*l.* gross and 4,848*l.* rateable, but these amounts the appellants wished to be reduced to 4,235*l.* gross and 3,850*l.* rateable. A consultation took place between the counsel on each side, and it was agreed to reduce the gross value to 5,218*l.* gross and 4,349*l.* rateable, each party to pay their own costs. There was a similar appeal by the company against the rating of their pipes and mains in the parish of St. Giles-in-the-Fields, for which they were assessed in the sum of 8,286*l.* gross and 7,520*l.* rateable, and it was agreed that the figures should be altered so as to reduce the gross value to 5,218*l.*, and the rateable value to 4,349*l.*

Clock Tower Competition, Brighton.—Forty-two designs have been sent in for the proposed clock tower and public conveniences in the North-street Quadrant. The Works Committee have selected the three designs marked "Passing Away," a shield with a cross on it, and "Gravity," to receive respectively the premiums 20*l.*, 15*l.*, and 10*l.*

Cuneiform Characters.—On the 10th inst., the Rev. W. Houghton concluded a course of two lectures at the Royal Institution on "The Probable Picture Origin of Cuneiform Characters." Mr. Houghton commenced his first lecture by remarking that all written language had probably been developed from pictorial signs representing either objects or ideas. A familiar instance of this was to be found in the Egyptian hieroglyphics and the ancient Chinese characters which originally were purely pictorial, but which had gradually been modified into arbitrary signs. The cuneiform or arrow-headed characters of the Babylonians had been evolved from an older picture-writing by a precisely similiar process. The lecturer then went on to urge that the Assyrians had borrowed their symbols from the Accadians, and to speculate on the probable common origin of the Chinese and Accadian characters. Instances were then given of the pictorial form lineal or archaic Assyrian characters as distinguished from the cuneiform or wedge-shaped into which the first developed. In the second lecture further instances were given, and among the most interesting were some showing in what high estimation the ancient Assyrians held women. Thus we find that the ideograph or symbol for mother consisted of a house with the mark conventionally used to denote a deity delineated between the horizontal lines. Again, we recognise in the lines for composing the symbol for grace and dignity the same mark that was held to have denoted a house, with the addition of the sign used to express woman, thus clearly proving that the Assyrians knew no better way of signifying grace than by symbolising a house with the presence of a woman to give it charm.

The Skeldergate Bridge, York.—This bridge has been opened. The foundation-stone was laid on the 12th of June, 1878. Designs were submitted for consideration by Mr. Thomas Page, who had been called in as consulting engineer. Mr. Page, however, died before the final selection was made; but the committee obtained the services of his son, Mr. George Gordon Page, M. Inst. C.E., whose designs were finally adopted. According to the *Engineer* it is of Gothic character, in keeping with the many architectural features of the city. The bridge consists of five arches, three of which cross the river, two being land arches for the waterside traffic. The centre arch has a span of 90 ft.; the two side arches have spans of 30 ft. each; and the two land arches have spans of 24 ft. each. The 30-ft. span, next the lodge, is a Bascule, or opening bridge, and is raised or lowered by hydraulic machinery. Beneath this opening bridge is an invert, 10 ft. 6 in. below the summer level, formed of brick in cement, 2 ft. 6 in. deep, supported on a deep bed of concrete on piles. The bascule bridge is formed with eight wrought-iron girders, affixed to a horizontal shaft, 10 in. in diameter, on which they turn. These girders are each 53 ft. 6 in. long, the portions overhanging the opening being about 35 ft. The total length of the bridge, including the abutments of the land arches, is 308 ft. 8 in., and the width is 40 ft. The whole of the work is faced with Bramley Fall stone. The Corporation intrusted the ironwork to Messrs. Handyside & Co., of Derby, doing the foundations and masonry by its own workmen, under the direction of Mr. Styan, the city surveyor. Mr. Robert Nunn has been the resident engineer under Mr. Page. The approaches have involved a considerable amount of work, and the total cost of bridge and approaches is about 50,000*l.*

Compensation Case.—In the Sheriffs' Court, Red Lion-square, before Mr. Under-Sheriff Burchell and a special jury, the case of Morgan *v.* The Metropolitan Board of Works was heard. It was a claim for copyhold property, 1, Chestnut-row, Monte Video-place, Kentish Town, taken by the Metropolitan Board of Works for public improvements. Mr. Grantham, Q.C., M.P., was counsel for the claimants; Mr. Philbrick, Q.C., represented the Metropolitan Board of Works. The business carried on by the claimant, that of a wheelwright, was an old-established one. Mr. Alderman Ellis, who was called for claimant, estimated the claim at 6,000*l.*; Mr. H. H. Bridgeman, at 7,200*l.*; Mr. Virgoe Buckland, at 6,000*l.*, exclusive of fixtures and loss by removal; Mr. Galsworthy, about 6,000*l.*; Mr. J. R. Bonny was called for the Board, and gave about 1,500*l.*; Mr. Beadel, 1,430*l.*; Mr. E. N. Clifton, 1,435*l.*; Mr. Furness, 1,430*l.* The jury awarded 3,000*l.*

The City Walls of York.—The other evening a portion of the terraced platform of the city walls at the end of Monk-court, and at the rear of Mr. Gray's garden, Minster-court, fell to the ground. There was scarcely any wind at the time, and the portion which has fallen was apparently in a substantial state of repair. It is surmised that the foundations have been injuriously affected by the great quantity of rain and snow during the last few months. A length of about 30 ft. of the terrace has fallen, together with the entire of the supporting-wall; and the whole of the *débris*, which amounts to several tons, now lies in a hollow at the foot of Mr. Gray's garden, immediately adjoining the Observatory. The battlemented portion of the wall remains intact, with the exception of a small gap on a level with the rampart, which aperture is the only sign of the accident to be seen from Lord Mayor's-walk. The walls, in many places on Lord Mayor's-walk, and at the back of the houses in Gillygate, are in sad need of repair. The *York Herald* says it is to be hoped that this mishap will call the attention of the citizens generally, and the corporation particularly, to the desirability of the ancient walls of York being placed in an efficient state of repair, and that ere long the walls between Bootham and Monk Bar may be thoroughly restored and thrown open to the public, in the same manner as was recently done between Monk Bar and Layerthorpe Postern.

The Projected Channel Tunnel.—The works for the proposed tunnel from Dover to Calais are stated to have made such satisfactory progress that its promoters, Colonel Beaumont, R.E., and Captain English, R.E., are now able to employ three shifts of men constantly throughout the twenty-four hours, and are sanguine of being able to bore about 30 ft. per day when all the machinery is perfected. At present, two drills, worked by engines driven by compressed air, are at work, and about thirty labourers are employed. The bore is 7 ft. in diameter, and the soil is chalk. It is so firm that the engineers are of opinion that no brick or cement work will be required to shore it up. Hitherto the difficulty they have had to contend with has arisen from the quantity of water which has found its way into the cutting, and which has been pumped out by means of a powerful engine placed at the mouth of the shaft leading into the tunnel. This shaft is about 300 ft. long, and the boring already accomplished reaches upwards of 500 ft. A new shaft is being driven through Shakspeare Cliff, which, when completed, will be about 200 ft. in depth. This will enable several additional hands to be employed, and the work to progress much more rapidly than at present.

The Iron Trade.—The downward movement of prices in the English crude iron market has been fortunately arrested, and though it would be premature to say how far the slight improvement experienced will prove permanent, there are signs of a change coming full of encouragement even to the most timid. The lowest level of price was reached last week, and the consequence of the rally this week will be to inspire more confidence, a feeling which appears to have made itself felt already in several markets. Although stocks of pig-iron at Glasgow and elsewhere are extraordinarily heavy,—larger than ever before,—it must not be entirely lost sight of that consumption is growing with the production of crude iron. The manufactured iron market still continues quiet, but the steel trade is displaying renewed vitality. Shipbuilding operations, now the weather has fairly broken, are in full swing again, and engine-works, boiler-makers, and makers of heavy iron and steel are beginning to feel the effects of that briskness. Orders for railway rolling-stock are also becoming more abundant.—*Iron.*

Italy of Old.—The *Times* correspondent says that in the excavations now being carried on in the neighbourhood of the theatre at Ostia, an altar of remarkable beauty has just been discovered. Upon it are subjects illustrating the birth of Romulus and Remus, sculptured in such high relief that some of the figures are almost detached from the ground. On one side is the Palatine, washed by the waters of the Velabrum, and the shepherd Faustulus looking down from the cliff upon the twin boys; on another are Rhea Silvia and the god Mars, with a genius above them drawing them together; while on the third are Cupids playing with the helmet and arms of the divinity. It is the most important work of art discovered for some time at Ostia, and is in a fine state of preservation.

Sanitary Assurance.—On Tuesday night Professor F. de Chaumont delivered a lecture to a large audience at the London Institution on sanitary assurance. Mr. J. Eric Erichsen, F.R.S., President of the Royal College of Surgeons, took the chair. The lecturer observed that of the 700,000 deaths per annum recorded by the Registrar-General consumption caused about 70,000; diseases of the respiratory organs, 100,000; diarrhœa, 33,000; enteric fever, 11,000; scarlet fever, 25,000; and diphtheria, 3,500. Some of these diseases could be prevented altogether if dwelling-houses were put in a good sanitary state, and others might be modified to a very material extent. These diseases were propagated by foul air and foul water. The lecturer went on to show the fearful extent of mortality and sickness caused by defective sanitary arrangements, and to call attention to the Sanitary Assurance Association which had been formed last November. The object of this association was to inspect the sanitary arrangements of the dwellings of those who chose to become members. When a house was found to be in a proper sanitary condition, a certificate would be granted. Mr. Erichsen said that the work of the surgeon was materially retarded or aided by the sanitary state of the house in which the patient lay. He cordially approved of the association, and thought it had a large field of usefulness before it. On the motion of Sir Joseph Fayrer, seconded by Mr. Brudenell Carter, a vote of thanks was passed to the lecturer.

Tapestry Painting Exhibition. — The judges,—Sir Coutts Lindsay, bart., and Mr. G. F. Watts, R.A.,—have awarded the prizes in the Tapestry Painting Exhibition, now being held at the galleries of Messrs. Howell & James, Regent-street. Amateur: the Princess Mary prize, presented by H.R.H. the Princess Mary Adelaide, Duchess of Teck, to the Countess of Warwick; the Lady Patronesses prize, a gold badge, presented in the name of the lady patronesses, Miss M. Shoesmith; the *Queen* prize, five guineas, presented by the proprietors of the *Queen* newspaper, for lady-amateurs, Miss Ethel Cameron-Galton; the *Ladies' Gazette of Fashion* prize, five guineas, presented by the proprietors of the *Ladies' Gazette of Fashion*, Miss Emily A. Berridge; the judges' prize, a silver badge, presented in the name of the judges, Miss A. Goodday; the studio prize, a silver badge, presented by Messrs. Howell & James, for the best work exhibited by any lady who has had a course of ten lessons in their art-studio, Miss S. Lawson. Designs: Prize of two guineas and one guinea for a panel of 60 by 20, not awarded; prize of one guinea for a panel of 33 by 17, Miss Mayo. Various other prizes were awarded.

Sanitary Institute of Great Britain.—At a meeting of the Sanitary Institute, on March 9th, Dr. B. W. Richardson, F.R.S., in the chair, the discussion was continued upon the paper read at the last meeting by W. H. Michael, Q.C., F.C.S., upon the Law in Relation to Sanitary Progress. With regard to the re-arrangement of districts, there was thought to be very little doubt that for all sanitary legislation it was desirable that the division should be in conformity with some natural or physical feature, such as river basins. It was considered that the removal of urban and rural distinctions would be a great benefit, and that a Ministry of Public Health should be formed, to guide, encourage, and control local self-government, and place it on a good basis. Most of the speakers agreed with Mr. Michael that sanitary legislation, to be effective, must be compulsory, especially as regards the isolation of infectious diseases and the prevention of over-crowded dwellings.

The International Medical and Sanitary Exhibition.—The arrangements for this exhibition are progressing so satisfactorily that it promises to be the most important sanitary exhibition hitherto organised in this country. Applications for space are now being rapidly sent in, as the 31st inst. is the last day fixed by the committee for receiving them. Up to March 15th applications for 984 feet had been received by the committee. The guarantee fund, at the meeting of the committee last Tuesday, was reported to amount to 1,026*l.* 7*s.*

Fall of Houses in Stratford.—A block of shops and houses has been in course of erection in Angel-lane, Stratford. Two of the centre houses on Wednesday last fell in with a loud crash. One man was severely injured, and it is feared that some of the workmen are in the ruins. The *débris* fell into the basement.

The City and Technical Education.—The annual meeting of the governors of the City and Guilds of London Institute for the Advancement of Technical Education was held on Monday, in the Hall of the Mercers' Company, Cheapside. Sir Sydney Waterlow, M.P., presided. The Council reported that the estimated cost of the central institution at Kensington,—to be built at their instance,—would exceed 50,000*l.*, and the total cost was estimated at 76,000*l.* The establishment of local classes had done much towards exciting an interest in technical education in manufacturing districts. Grants to the University and King's Colleges (400*l.* a year each), the Horological Institute (500*l.* and 350*l.* a year), Nottingham (105*l.*), Lancashire and Cheshire Union (105*l.*), and Artisans' Institute (300*l.*), had been carefully expended. Grants were promised of 250*l.* to the School of Art Wood-carving, and 105*l.* to the Mining Association of Devon and Cornwall. In 1880, 816 students presented themselves for examination. This year, up to the present, the returns to the central office showed that about 2,500 candidates were studying twenty-three subjects of instruction at seventy-eight different centres.

Blackbrook, St. Helen's.—This neighbourhood has been long in want of school accommodation. The Messrs. Richard Evans, of the Haydock Collieries, have erected, on a prominent and advantageous site, a large and substantial block of school buildings for boys, girls, and infants. The arrangements include (in addition to the school-rooms), class-rooms, galleries, lavatories, cloak-rooms, &c., and spacious yards. The desks and fittings (supplied by Messrs. Colman & Glendinning) have all the latest improvements. The schools are so arranged that meetings, other than for school purposes, can be held in them if desired. The designs are by Mr. Edmund Kirby, architect, of Liverpool, and the builder is Mr. William Owen, of that city.

Halifax.—St. James's Church, Halifax, is undergoing renovation. The whole of the walls, ceiling, and gallery fronts have been decorated by Mr. Binns, of King-cross. The gas standards have been supplied by the Midland Metal Works, Coventry; and a pulpit by Messrs. Jones & Willis, of Birmingham. All the heavily-leaded windows have been removed, and replaced by windows in cathedral glass of two tints, supplied by Mr. Stafford, plumber, of Halifax. The open stalls in the nave of the church have been made by Mr. W. Gaines, joiner, of Stannary. The works have been carried out under the plans of Mr. W. S. Barber, architect, Halifax.

Wednesbury and the Walsall Sewerage Scheme.—The Wednesbury Local Board, with the view, if possible, of obviating the necessity of opposition to the Walsall Sewerage Scheme, on the ground of the Walsall Corporation requiring land in the district of Wednesbury, which may hereafter be required by the Board for sewage irrigation, have agreed to appoint Mr. Pritchard, of Birmingham and London, to report on the matter, and especially as to the suitability of a scheme for Wednesbury of other lands than those in question.

Serjeants'-inn Hall and Chapel.—The building in Serjeants'-inn, formerly occupied by the Registrar of Joint Stock Companies, has been purchased by the Church of England Sunday School Institute, who will in future make it the centre of their operations. They will have the advantage of its lecture-hall for conferences, meetings, &c.—*City Press.*

Acoustic Improvements.—We are glad to learn from an official letter that the introduction to the Lecture Theatre at the South Kensington Museum by Mr. A. C. Engert of his patent apparatus for the improvement and distribution of sound has remedied the acoustic defects of the room to a very considerable extent, although he was not allowed to employ the invention in its entirety.

The Wesleyans of Radcliffe are about to erect a handsome chapel to accommodate 850 persons. The commission has been entrusted to Mr. A. W. Smith, of 42, Market-street, Manchester, whose design has been selected in competition with Mr. Woodhouse, of Bolton, and Messrs. Maxwell & Tuke, of Bury.

Droitwich.—The recently-appointed rector of St. Andrew's, Droitwich, has initiated a movement to restore or rebuild the church. A meeting is to be held to discuss the question as to whether efforts shall be made to erect a new church on another site, or restore the present structure.

Chelsea.—The Chelsea Vestry have adopted a report submitted by their surveyor, Mr. G. H. Stayton, C.E., offering to co-operate with the Metropolitan Board of Works in effecting an improvement in the northern approach to the new Battersea Bridge. They have also resolved that the parish mortuary in the old burial-ground in King's-road be reconstructed, "and made suitable to the requirements of the age," and have requested the surveyor to submit plans and estimates of the same.

"Ornament."—On Thursday, the 17th inst., Mr. H. H. Statham gave, at the Royal Institution, Albemarle-street, the first of a series of four lectures on "Ornament Historically and Critically considered." The rest will follow on March 24th, March 31st, and April 7th.

TENDERS

For Redditch sewerage works. Messrs. Gotto & Beesley, engineers:—

Dyer, Camberwell	£13,733	0	0
Coker, Luton (too late)	11,707	0	0
Ridal & Armson, Sheffield	10,317	0	0
Rigby, Worksop	9,900	0	0
Davison, Shildon	9,718	0	0
Jevons, Dudley	9,033	0	0
Dickson, Sevenoaks	8,999	0	0
Harris, Great Harwood	8,770	0	0
Mackay, Hereford	8,311	0	0
Raynor, Liverpool	8,369	0	0
Currall & Lewis, Birmingham	8,100	0	0
Burkitt, Birmingham	8,100	0	0
Smith, Westminster	7,975	0	0
Jones & Fitzmaurice, Birmingham	7,960	0	0
Vale, Kidderminster (too late)	7,920	0	0
Smith, Basford	7,149	0	0
Law, Kidderminster (accepted)	7,061	0	0
Fell, Leamington	6,239	0	0

For repairs and decoration to the Corn Exchange premises, Leighton Buzzard. Mr. Frederick Gotto, architect:—

Gibbs, Leighton Buzzard	£100	0	0
Webb, Leighton Buzzard	99	10	0
J. & R. Purser, Leighton Buzzard	92	0	0
Tutt, Leighton Buzzard (accepted)	89	0	0

For stables, farm buildings, garden walls, and alterations to mansion, for Miss J. D. Smith, at King's Ride, Ascot. Mr. Chatfeild Clarke, architect. Quantities by Mr. H. S. Leonard:—

Hall, Beddall, & Co. (accepted)	£16,765	0	0

No competition.

For warehouse, Aldermanbury. Messrs. Ford & Hesketh architects:—

Kirk & Randall	£5,071	0	0
Hart	4,946	0	0
Peto Bros.	4,840	0	0
Conder	4,661	0	0
Lawrence	4,660	0	0
Perry & Co.	4,622	0	0
Adamson & Sons	4,574	0	0
Simpson & Son	4,551	0	0
McLachlan & Sons	4,538	0	0
Scrivener & Co.	4,514	0	0
Ashby, Bros.	4,473	0	0
Brass (accepted)	4,395	0	0

For the erection of new Board school, for 600 children, at Merton-road, Tooting, for the London School Board. Mr. E. R. Robson, architect:—

Marsland	£6,996	0	0
Nightingale	6,991	0	0
Tyerman	6,897	0	0
Higgs & Hill	6,840	0	0
Stimpson & Co.	6,682	0	0

For the erection of new Board school, for 800 children, at Oldridge-road, Holly-grove, Balham-road, for the London School Board. Mr. E. R. Robson, architect:—

Lathey Bros.	£9,397	0	0
L. & H. Roberts	8,956	0	0
Shepherd	8,899	0	0
Marsland	8,794	0	0
Hobson	8,743	0	0
Downs	8,733	0	0
Thompson	8,691	0	0
Higgs & Hill	8,629	0	0
Nightingale	8,620	0	0
Jerrard	8,564	0	0
Lawrence	8,353	0	0
Stimpson & Co. (accepted)	8,260	0	0

For additions to Board school at Albion-road East, Shepherd's-bush, for the London School Board. Mr. E. R. Robson, architect:—

Booth & Sons	£4,185	0	0
Rankin	4,097	0	0
Chappel	4,006	0	0
Higgs & Hill	3,968	0	0
Hook & Oldrey	3,932	0	0
Harris & Wardrop	3,896	0	0
Chamberlain	3,769	0	0
Tongue	3,733	0	0
Grover	3,696	0	0
Stimpson & Co.	3,628	0	0

For alterations at Church-street, Chelsea, for the London General Omnibus Company. Mr. Tosh, architect. Quantities by Mr. Bolton:—

Goddard	£605	0	0
Richeirs & Mount	515	0	0
Brown	499	0	0
Evans	490	0	0
Boyce	469	10	0
Lucas & Son	467	0	0
Richardson	455	10	0
Beale	448	0	0
Judd	420	0	0
Garrud	419	15	0

For the erection of hospital for infectious diseases, to accommodate twenty-four beds, Keycol Hill, Sittingbourne. Mr. W. Leonard Grant, architect:—

Hopper, Rochester	£4,475	0	0
Seager, Borden	4,149	0	0
Naylar, Rochester	4,146	0	0
Jones & Co., Gloucester	4,090	0	0
Vaughan, Maidstone	4,050	0	0
Adcock, Dover	4,045	0	0
Shrubsole, Faversham	3,988	0	0
Callund, Rochester	3,970	0	0
Benne, Walmer	3,890	0	0
Pavey, Sittingbourne	3,889	0	0
Cornelius, Whitstable	3,849	0	0
Beaumont, Milton (accepted)	3,847	0	0
Judges, Boughton	3,475	0	0
Hughes, Whitstable	3,421	0	0

For the Omega-street schools, to accommodate 923 children, for the Portsmouth School Board. Mr. Archd. H. Ford, architect:—

Seal Bros., Richmond	£10,500	0	0
Jones & Co., Gloucester	8,750	0	0
Long'ey, Worth (Sussex)	8,568	0	0
Quick, Southsea	8,363	0	0
Burbidge	8,265	0	0
W. R. & C. Light, Landport	8,190	0	0
Ward, Southsea	7,926	0	0
Tull, Southsea	7,900	0	0
Hayter, Landport	7,795	0	0
Evans, Southsea	7,777	0	0
Cooper, Landport	7,513	0	0
Lewis, Southsea	7,425	0	0
Earwaker, Southsea (accepted)	7,210	0	0

For two houses, Highfield, Southampton, for Mr. Henry Scrase. Messrs. J. G. Poole & Son, architects. Quantities supplied:—

Stevens & Son, Southampton	£556	0	0
Sandon, Southampton	538	0	0
Holt, Freemantle	527	0	0
Bailey & Son, Southampton	523	10	0
Martin, Southampton	510	0	0
Cole, Freemantle	507	0	0
Palmer, Freemantle	507	0	0
Bostock, Southampton	499	14	4

For the erection of villa residence, Hastings, for Mr. M. Hurlstone. Mr. D. Jones, architect. Quantities supplied:—

Coussens, Hastings	£865	0	0
Womersley, Hastings	858	0	0
Avis, Hastings (accepted)	829	0	0
Stubberfield, Ore	828	0	0

For building new wing to the Crown Hotel, Southampton. Mr. A. W. Galbraith, architect. Quantities supplied:—

Wyett, Southampton	£1,433	0	0
Sanders, Southampton	1,374	0	0
Crook, Southampton	1,350	0	0
Grimwood, Winchester	1,330	0	0
Cole, Southampton	1,250	0	0

For alterations to premises, corner of Tottenham-court-road and Euston-road, for Messrs. Chas. Baker & Co. Messrs. N. S. Joseph & Pearson, architects; Mr. S. B. Wilson, surveyor:—

Pritchard	£3,395	0	0
Patrick	3,388	0	0
Langmead & Way	3,347	0	0
Scrivener	3,317	0	0
Axford	3,275	0	0
Merritt & Ashby	3,180	0	0
Williams	3,057	0	0

For alterations to plant at Messrs. Gordon & Co.'s brewery, Caledonian-road. Messrs. Scamell & Colyer, engineers:—

Bennett & Son (accepted).

For additions to the Royal Hotel, Clacton-on-Sea, for the Clacton-on-Sea Hotel Company (Limited). Mr. F. E. Morris, architect:—

Tongue, Plumstead	£2,110	0	0
Saunders & Son, Dedham	1,935	0	0
A. & E. Candler, Clacton	1,865	0	0
Dupont, Colchester	1,783	0	0
Everett & Son, Colchester (accepted)	1,770	0	0

For alterations at No. 3, The Pavement, Clapham, for Messrs. Stringer & Bird:—

Garrett & Son (accepted).

For the erection of four houses for Mr. Isaac Hatterley, Lincoln. Mr. Thos. Martin, architect:—

Cowen & Lansdown, Lincoln	£798	0	0
Wright, Lincoln	787	0	0
J. & H. Woolhouse, Lincoln	780	0	0
Horton, Lincoln*	662	0	0
Chambers, Lincoln	596	10	0
Cox (accepted)	595	0	0

* This tender did not include front fencing and palisading, nor back fence walls, amounting to over 50*l.*

For new chancel and re-seating St. James's Church, Shirley, Southampton:—

	Chancel.	Seats.
Dyer	£1,019	£400
Bull & Sons	975	376
Chapman	960	629
Brinton & Bone	950	520
Stevens & Son (accepted)	945	394

For alterations and additions to the Surprise Tavern, Bowling-green-lane. Mr. J. Miller, architect:—

Gill	£1,976	0	0
Smith	1,790	0	0
Adams	1,689	0	0
Griffiths	1,685	0	0
Yardley	1,640	0	0
Jackson & Todd	1,547	0	0

For house, in the Bulmershe-road, Reading, for Mr. W. Belcher. Mr. William Simmons, architect. No quantities:—

Wernham	£468	0	0
Blake	465	0	0

The Lincoln Urban Sanitary Board accepted, on Tuesday last, the schedule of prices sent in by Messrs. Cowen & Lansdown for the connexions to the main sewerage. The Authority refused the lowest tender of Mr. R. Conder; and Messrs. Binns, Brothers, withdrew their tender, which was the next lowest.

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